A Soft Systems Approach to Identifying and Resolving Organisational Issues

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SEPTEMBER 1995

Submitted to the University of Cape Town, South Africa, in partial fulfilment of the requirements of the Degree of Master of Industrial Administration (MIndAdmin).

DECLARATION

I, Larry Narunsky, submit this thesis for the Degree of Master of Industrial Administration. I claim that this is my original work and that it has not been submitted in this or any similar form for a degree at any University.

Signed by candidate

LARRY NARUNSKY

ACKNOWLEDGEMENTS

I would like to express my gratitude to the following:

- My supervisor, Associate Professor Tom Ryan, for his constant advice and guidance.
- Rhomberg Bräsler, for their support and assistance.
- All those employees of Rhomberg Bräsler who endured lengthy interview sessions.
- My family and friends for their support.
- Gail, for proof-reading this thesis and for enduring the whole process.

CONTENTS

LIST OF ILLUSTRATIONS AND TABLES

ABSTRACT

INTRODUCTION

Over recent years at Rhomberg Bräsler, a small-to-medium sized South African manufacturer and supplier of electronic process control products, certain issues or problems have been perceived by various employees of the company, to have arisen. Though not clearly definable, the issues are believed by many to be the result of the rapid expansion phase of the organisation. This thesis is concerned with identifying and resolving these organisational issues using a methodology referred to as Soft Systems Methodology. (Checkland, 1981).

THE PROBLEM SITUATION

The process at Rhomberg Bräsler began with an initial attempt at describing the 'problem situation', i.e. a situation in which people perceive that there are problems, but there is no clear definition of what those problems are. (Checkland, 1981). The problem situation, based on my perceptions as well as brief perceptions of others, was initially perceived to be relating to issues regarding, amongst others, attitudes, relationships, trust, skills and communication.

WORLD CLASS MANUFACTURING

Management has been aware of the problem situation and believes that the solution lies in the development of a 'World Class Manufacturing' or 'WCM' program (Schonberger, 1986), which will, in the long term, resolve all the pertinent organisational issues.

The literature on WCM was reviewed to extract its essence and to provide a critique on its processes and its usefulness in the Rhomberg Bräsler context. This review outlined the main techniques and principles of WCM. However, the literature also revealed evidence that the many techniques and principles, which were emulated from other companies, or from books, and simply introduced in an organisation, seldom result in expected improvements. The necessity to be committed to obtaining the involvement and trust of everybody in the organisation, as well as providing motivation and people development, before embarking on any process of organisational change, was thus realised.

ORGANISATIONAL CHANGE - ADOPTING A SYSTEMS APPROACH

It was initially clear that the problems being experienced at Rhomberg Bräsler were complex and could not be accurately defined. Thus, a more lateral look at the problem situation was required. It was also realised that Rhomberg Bräsler can be conceptualised as a complex system, consisting of parts which interact. In addition, the literature reveals that programmes such as WCM "manipulate the parts of systems without regard to how their manipulations affect the whole through interaction of the parts." (Ackoff, 1995, p43). It thus became necessary to place a higher priority on investigating the relationships and the interactions between the parts of the system, than on investigating the parts themselves (i.e. applying a systemic approach). Hence, the literature on 'Systems' and 'Systems Thinking' was reviewed. In essence, 'Systems Thinking' is simply the way in which one organises one's thoughts in a

manner relating to the structure of, and relationships within reality. Systems do not actually exist in reality. Rather, the notion of a system is used as a means of conceptualising reality. (Ackoff, 1995). Furthermore, the major problem with 'problem solving' or 'issue resolving', from the 'systems' point of view, is to first identify, or define, the nature of the problems, or issues, at hand.

Based on the literature reviewed, the following hypothesis was formulated:

> ***For an emerging small company developing into a corporate structure, it is necessary for wide-scale organisational change to occur. However, this change must be managed systemically, taking the viability of the organisational structure and processes, into account. It is also imperative for the attitudes of the people of the organisation to change, before implementing changes that will be sustained.***

This hypothesis states that a small company which grows rapidly from a small operation into a corporate environment, will experience problems, unless organisational change is managed systemically in terms of structure, processes and attitudes. Rhomberg Bräsler has grown into a small corporate environment and is experiencing 'problems'. Therefore, if the hypothesis is true, organisational change at Rhomberg Bräsler needs to be managed systemically.

It was therefore necessary to take a systems approach to identifying and resolving the organisational issues at Rhomberg Bräsler. This was performed through the application of a suitable systems methodology at Rhomberg Bräsler, in an attempt to prove or disprove the hypothesis. Once again, in the study of systems and systems thinking, and in this thesis, the concept 'system' is used as the basis for a modelling language or as a basis for thinking about the organisation (i.e. Rhomberg Bräsler) and its problem situation.

In addition, according to Senge (1990), systems thinking is a holistic approach to problem solving (i.e. a shift of mind from seeing parts to seeing wholes) and most problem situations in the world involve human beings in social roles attempting to take purposeful action in order to improve a situation perceived as being problematical. These types of 'systems', which are of most concern to the Rhomberg Bräsler context, are known as 'human activity systems'. (Checkland, 1981).

SELECTION OF SYSTEMS METHODOLOGY - TOTAL SYSTEMS INTERVENTION (TSI)

A process, introduced by Flood and Jackson (1991), called 'Total Systems Intervention (TSI)' was employed in order to define the nature of the problem situation at hand, with a view to selecting a systems methodology for use at Rhomberg Bräsler. According to Flood and Jackson (1991), TSI is designed to help choose an appropriate methodology for solving management problems as they are perceived, while still recognising that other perceptions of the problem are possible.

TSI involves the use of various systems metaphors with which to view the organisation and to determine which is most relevant to the issues at hand. These metaphors are as follows:

- Machine metaphor (closed system model)
- Organismic metaphor (open system model)
- Neurocybernetic[1] metaphor (viable system model)
- Cultural metaphor
- Political metaphor

These systemic metaphors are intended to help one think creatively about problem situations by using them as "filters" through which to view the perceived problem. Different

[1] Cybernetics is the study of automatic communication and control in functions of systems.

metaphors focus on different aspects within an organisation such as on organisational structure or on 'people' aspects. "If one of the metaphors is dominant in bringing issues clearly into focus, then use of a systems methodology, which operates in a manner complementary to that metaphor, can obviously be recommended." (Flood and Jackson, 1991, p1). "The whole point of using systemic metaphors in the process of TSI, is to avoid the drawing of premature or narrow conclusions about the issues being faced." (Flood and Jackson, 1991, p43). The outcome of this phase is thus a dominant metaphor. However, there may be other metaphors which also highlight the organisation's difficulties and concerns. Both the dominant and other metaphor/s need to be applied in the 'Choice Phase' of TSI (i.e. choosing a suitable systems methodology). With the use of TSI and metaphor analysis for viewing the problem situation at Rhomberg Bräsler, the dominant metaphor was found to be the Cultural metaphor, with the Neurocybernetic metaphor in a supportive role.

The 'Choice Phase' of TSI began with determining the nature of the system and the nature of the relationships between the participants of the problem situation. The nature of a system, according to Flood and Jackson (1991) can be either simple or complex, depending on its attributes, such as the number of elements and interactions, the degree of organisation of the interaction, the nature of the laws governing behaviour and the degree of goal pursuance. Based on their definitions, Rhomberg Bräsler can be conceptualised as a complex system.

In addition, the relationships between the participants, depending on the degree of the alignment of their interests, values, beliefs, and actions, are considered to be unitary, pluralist, or coercive. Since the relationships at Rhomberg Bräsler are considered to be pluralist, the problem context at Rhomberg Bräsler was categorised as 'complex-pluralist', which then guided the choice of the most appropriate 'systems methodology' to be 'Soft Systems Methodology (SSM)'. (Checkland, 1981). According to Flood and Jackson (1991), SSM is a methodology for intervention in a problem context, where the nature of the problem/s is/are undefined and any course of corrective action is unclear. Hence the literature on SSM was reviewed.

SOFT SYSTEMS METHODOLOGY (SSM)

The use of SSM in an organisation, such as Rhomberg Bräsler, is intended to guide the process of solving problems within that organisation. The idea is to involve all those concerned with a particular problem situation, i.e. the participants, in order to try and 'solve' the problem, defined not by the company management, but as a result of analysing the opinions and perceptions of all those involved, i.e. opinions from executive management to shop floor staff. The employment of SSM endeavours to facilitate the communication and debate of each of the perceptions of the system within which the perceived problem situation exists.

According to Checkland (1981), real world problems may be 'hard', the solving of which entails finding an efficient means to achieve a defined end, or 'soft', where the goals themselves are undefined or problematical. The main philosophy behind SSM is the switch from a hard to a soft paradigm for use in resolving organisational issues.

THE VIABLE SYSTEMS MODEL (VSM) AND VIABLE SYSTEMS DIAGNOSIS (VSD)

The literature on the Viable Systems Model (VSM) and Viable Systems Diagnosis (VSD), was also reviewed, as these stem from the Neurocybernetic metaphor. "The Viable System Model offers a paradigm for problem solving. Its understanding offers a mental tool to approach the creation and design of effective contexts for the participation of people in human activities." (Espejo and Harnden, eds. 1989, p98). It is this paradigm, or approach to resolving organisational issues, which can help in the process of SSM (i.e. the dominant methodology for this thesis), since the emphasis of the SSM is on participation.

The outcome of Viable Systems Diagnosis (VSD) should indicate violations of cybernetic principles and expose organisational faults. A VSD of Rhomberg Bräsler would test the design of the company as a system and, if required, redesign certain structures and processes. This is what SSM sets out to do, but the VSM helps in maintaining cybernetic criteria in the organisation. Hence, Rhomberg Bräsler needs to remain viable in terms of its structures and processes. In addition, according to Flood (1993), viable systems thinking aids meaningful measurement and allows for participation, autonomy and motivation.

One of the criticisms of SSM provided in this thesis, is that SSM can fail, because organisations may fail to function properly because communication and control systems are poorly designed. Thus, an understanding of the VSM and VSD should prevent neglecting these systems while using SSM.

The scope of the intervention into Rhomberg Bräsler has been limited to the use of Soft Systems Methodology. VSM and VSD were not actually employed in the research phase of this thesis, but an understanding of them has provided a better understanding of the situation, in terms of organisational viability, autonomy, communication and participation. Therefore, a clear understanding of the VSM and of VSD should make the use of SSM and the understanding of its use, all the more rich.

THE PROCESS OF SOFT SYSTEMS METHODOLOGY (SSM)

The process of Soft Systems methodology generally involves **seven stages** and began with organised **'finding out'** (i.e. **stage 1** of the process of SSM), involving interviewing with, and observation of, the participants of the problem situation. Hence the literature on Ethnography and Ethnographic research was reviewed to understand further, the types, and validity, of different observation and interview techniques. As stage 1 and 2 of SSM is a process of 'finding out' and expressing the problem situation in terms of relevant human

activity systems, it was necessary to obtain data via research, which took the form of interviews with various participants of the problem situation (i.e. indirect observation) as well as direct observation. I also attempted to apply the ethnographic interview technique to obtaining information from certain employees at Rhomberg Bräsler.

Stage 2 of the process involved working towards a **'problem situation expressed'** to define relevant human activity systems, i.e. various notional systems, where people perform purposeful activities. However, these notional systems may not actually exist in any tangible form in the real world. Checkland (1981) has termed these intangible notional systems 'issue-based relevant systems'.

A **root definition**, i.e. a formal definition of what a system 'is', was formulated for each relevant human activity system. A **conceptual model**, consisting of the minimum number of activities, detailing what the system 'does', was constructed for each of the fifteen root definitions. Both root definition formulation and conceptual model building (i.e. **stages 3 and 4** of the process) take place in the 'systems thinking' world, where the analyst removes him/herself from the real world and performs (abstract) thinking **about** the real world, rather than thinking about issues in the real world. The resultant picture (i.e. the conceptual model), represents a model of a system, which can survive on its own, via processes of communication and control, while adapting to a changing environment. However this operational system model must also have a monitoring and control system model attached to it, which can determine the level of performance of the system in terms of effectiveness (is the system doing the right thing?), efficacy (is the system capable of doing what it is intended to do?) and efficiency (is the transformation process using resources in the best possible manner?). These ideas fall within the description of Stafford Beer's Viable Systems Model (VSM), because the VSM is essentially a conceptual model. (Espejo and Harnden, eds. 1989). Efficiency (or productivity), is necessary in organisations, especially where individual jobs are concerned. However, the importance of effectiveness (or performance) is stressed, because a system can be very ineffective, while still being efficient (or productive). According to Ackoff (1995), this is a case of doing the wrong thing right. Hence, regarding

the performance indices of the VSM, productivity is similar to the measure of efficiency of the conceptual model of the SSM process. Likewise, good performance relates to achieving effectiveness. Therefore, understanding the VSM can be very beneficial to understanding the conceptual model formulation in the process of SSM.

A very detailed **comparison** of the activities of the conceptual models with activities in the real world, was then performed with various people in the problem situation (i.e. **stage 5** of the process). The outcome of the comparison lead to points of discussion or debate, about issues at Rhomberg Bräsler, which potentially needed improvement or development. Changes in structure, processes and attitudes, being both systemically desirable and culturally feasible, were proposed and presented to, and discussed with, various of the participants in the problem situation, who were interviewed previously.

The results of the research of this thesis, presented in **stage 6** of the process of SSM, consist of a set of rules, or **proposals and recommendations**, in terms of structure, processes and attitudes. These set of rules are the basis for the next phase of SSM (i.e. **stage** 7 - **'Implementation'**). They are rules for action.

Stage 7 of the process of SSM involves the implementation of the proposed changes that are systemically desirable as well as being culturally feasible. However, as the scope of this thesis is limited to proposing these changes and does not include reports on the degree of success of any actual implementation made, the set of rules were tested against the opinions of the stakeholders at Rhomberg Bräsler. These proposals were categorised into changes in structure, processes and attitudes. The majority of changes were unanimously agreed upon. However, there were a few proposed changes that needed to be debated in order to reach agreement. The end result was a slightly modified plan for implementation which was unanimously anticipated to provided effective results at Rhomberg Bräsler. However, for any changes in structure and processes to be effective, it is first necessary to achieve changes in attitudes (i.e. to alter people's paradigms), to concentrate on cultural issues in the organisation, to develop relationships and to improve communication.

Considering the hypothesis that was postulated, it has been shown that Rhomberg Bräsler, i.e. an emerging small company developing into a small corporate environment, needs to undergo a process of organisational change in order to maintain growth while developing effectiveness in order to ultimately achieve performance. However, this process must be applied systemically, as this thesis has shown, while ensuring cultural feasibility.

Therefore, the proposed hypothesis is considered to be true. Furthermore, the research performed at Rhomberg Bräsler is ecologically valid. That is, it is possible to generalise from the actual social context in which the research took place, i.e. at Rhomberg Bräsler, to other contexts or settings, i.e. other organisations.

CRITIQUE ON THE USE OF SOFT SYSTEMS METHODOLOGY (SSM)

A critique of the use of SSM has been provided and covers issues such as:

- Difficulties in honing in on relevant issues.
- Subjectivity of deciding on relevant human activity systems.
- The process of formulation of root definitions and conceptual models.
- Formulation of root definitions and conceptual models for more than one level of resolution.
- Lack of detail in providing measures of performance for the conceptual models.
- Validity of hypothesis testing.
- Cycling back and forth through the SSM process.
- Compliance of cybernetic laws when dealing with complex organisations.
- Degree of participation of the stakeholders.

CONCLUSIONS

The process of SSM has been applied to the complex managerial and other organisational issues at Rhomberg Bräsler. A major problem in resolving organisational issues, is actually identifying or defining the problems, or issues, at hand. However, SSM endeavours to achieve this. Once a problem, or issue, is identified or defined, it is far easier to embark on a process of successfully resolving those issues.

In summary, SSM is essential when attempting to identify and resolve organisational issues. SSM is performed through a cyclical process of 'finding out', or identifying, organisational issues from varying perspectives, constructing models, systems thinking and comparison of the models with the real world, involving discussion and debate, leading to greater participation and learning, as well as taking action to provide for successful results.

However, SSM does not guarantee final answers or solutions, which are correct and accurate. As stated before, it is intended to provide for participation, learning, accommodation and better understanding of any situation in which problems are perceived, from varying perceptions.

CHAPTER 1

INTRODUCTION / DESCRIPTION OF THE PROBLEM SITUATION

This thesis is concerned with identifying and resolving organisational issues and details research that was undertaken in a manufacturing organisation, Rhomberg Bräsler - a company which has been experiencing problems, which have developed in recent years. There is a great deal of literature which deals with problems and problems solving. However, Checkland (1981) expresses that research should not be concerned with problems as such, but with problem situations, i.e. situations in which there are felt to be unstructured problems. This chapter describes the problem situation at Rhomberg Bräsler, prior to commencement of the research.

In recent years, a number of programmes at Rhomberg Bräsler have been developed as part of a Total Quality Management (TQM) programme and attempts have been made at their implementation. These have not proved to be as successful as anticipated, perhaps as a result of lack of motivation and commitment.

The programmes are as follows:

1. Blue Skies (based on the Quality Circles concept)
2. Performance Improvement Program (PIP)
3. Quality Improvement Process (QIP)
4. Failure Mode and Effect Analysis (FMEA)

In addition, management at Rhomberg Bräsler have attempted at using the above programmes to create a culture of 'Ongoing Improvement' within the organisation.

When I first spent time at Rhomberg Bräsler (November 1988 to February 1989), the company was approximately half the size that it is today. The head office and factory shared a building, which was not conducive to high productivity, due to cramped working conditions and poor ventilation, resulting in excessive cold in winter and heat in summer. However, productivity was high and people generally seemed happy in their respective jobs. One got the impression that working at Rhomberg Bräsler was like being a part of a 'family', with much mutual trust and co-operation between management and staff.

Over the past few years, the company has grown quite considerably. This growth is a part of the realisation of the company's long term plans. The organisation formed two separate companies: Rhomberg Bräsler Electronics (RBE), the sales and marketing company, and Rhomberg Bräsler Manufacturing (RBM), the manufacturing company, encompassing all other company functions. Rhomberg Bräsler Manufacturing has become more bureaucratic and its hierarchical structure has become more formalised. The company recently obtained its ISO9001 quality rating. As a result of the campaign to try and obtain ISO9001, many more policies and procedures have been instituted. Over recent years, new products have been introduced which are more difficult to manufacture and test.

The whole company has relocated to new premises, which are much more luxurious and have better facilities. The number of staff on the production line has increased approximately twofold, but productivity has declined. It seems that management has, over the years, detached themselves from the production line and more of a division has been created between head office and factory staff.

Over the past few years, management has mentioned the possibility of implementing a wage incentive scheme in order to reward those who perform well in their jobs. Management has

delayed the implementation of such a scheme for as long as possible, due to the following reasons.

- Many variations of different products are produced, thus rendering it both time consuming and difficult to measure accurately, which worker performs which tasks. To give you an indication of quantities, the company's two major product lines consist of 75 different monitoring relays, each available in one of 10 supply voltages, and 150 proximity sensors.
- Such a scheme has to be carefully maintained and requires someone responsible to record data, such as time taken to perform work and units of good product produced.

However, due to pressure from production staff, management has agreed to implement some sort of reward system for achievement on the production line. Production management has begun calculating standard times for different operations in order to set performance standards against which to measure if the worker has produced more than the standard amount required. As yet, no scheme has been implemented, which has caused bad feeling amongst some of the production staff.

Certain of these staff members have, over the past few years, chosen to join a union to represent their interests, despite the existence of an active internal 'staff representative committee'. With more and more staff members joining the union, the majority are now members. As a result, most company-staff negotiations and dealings have to be performed through the union.

This has caused a great deal of tension between management and the production staff. Management feels that factory staff believe that management have failed to perform their duties in the best interests of staff and that management are mistrusted. However, factory staff generally believe that this is not the case. Management and factory staff have had several open discussions and confrontations, in order to obtain a general understanding of why staff members opted to join the union. There have also been discussions with

management and all company employees, where all were invited to openly air their opinions, regarding any company problems or issues. Unresolved issues from months, and even years back, were raised and discussed, but not necessarily resolved.

Following these discussions, many employees experienced a great deal of frustration, as they felt that their viewpoints and opinions had been neither understood, nor accepted by management.

Management concluded that the organisation suffered from poor internal communication, despite all the communication procedures already implemented in the organisation, such as:

- the invitation to always express grievances to one's immediate superior verbally, or
- via the formal instituted grievance procedure, or even
- directly to the staff representative committee, or
- via a note deposited into the suggestion boxes.

Many staff members, especially those who feel that they will be with the company until their retirement, are concerned about the future success of the company and whether the company is on the road to achieving its long term goals. They are also concerned as to what would happen in the event of upper management retiring or leaving the company.

The result of all the above, has led to a drift between management and the factory staff and has also resulted in decreased productivity and low morale and motivation amongst staff.

The 'problems' being experienced at Rhomberg Bräsler, as I perceive them, can hence be summarised, in no specific order, as follows:

- The company is experiencing 'growing pains'.
- Productivity and morale are not at desirable levels.
- There is a lack of trust between management and factory staff.

- TQM programs have not been as successful as anticipated
- Members of staff lack a common vision of where the company is headed.
- The company has become more formalised, leading to the erosion of the 'family' feeling.
- There are no direct incentives for each employee to improve performance in his/her job.
- The symptoms often reveal poor communication within the company.
- The company has become unionised, leading to tension between management and staff.
- The low productivity leads to higher costs and ultimately affects the company's international competitiveness.

Let me at this point, re-iterate that this summary is my perception of the problems being experienced at Rhomberg Bräsler and that I appreciate that there are different, may they be similar or conflicting, perceptions and definitions of the same problem situation.

During the last year, two MBA workgroups, from the University of Cape Town Graduate School of Business, performed separate analyses of Rhomberg Bräsler as a company. A brief compilation of their criticisms, relating to operations and information processing, is as follows:

- There needs to be a close relationship between production and marketing.
- The cost of getting a product to market is not determined.
- Not enough emphasis is placed on human resource development.
- Management style is paternalistic which leads to resentment. A more 'sophisticated consultative' style is recommended.
- A fundamental mindset shift is needed.
- Training needs to be supported.
- The overall company information systems need to be improved to cater for future expansion and development.

- Labour issues in the organisation are becoming increasingly prominent.
- The company needs to develop and maintain a learning culture in order to continuously improve its operations.
- Despite the fact that Rhomberg Bräsler workers are better paid and have better work conditions than other workers in the same industry, they still remain at the bottom in the corporate hierarchy, with bleak prospects of moving upwards in the organisation. It is this issue of inequality in status and their limited prospects, that may be the root cause of the apparent dissatisfaction amongst workers.
- Budgets and forecasts are not linked directly with the MRP facility.
- If on-line information was available to the production staff, they could make scheduling decisions themselves.
- There is a desire for further skills training.
- Although an effort is made by management to recognise exceptional worker performance, the lack of an implemented incentive scheme is considered, by staff, to be unacceptable.
- Despite good communication in the organisation, some feel it can be even better.
- Production problems do not get solved during the "Blue Skies" quality circles.

Many of the points described above, such as the need for human resources development and training, a more 'consultative' management style, a mindset shift and the development of a learning culture, more autonomy and performance recognition and better communication, re-inforce my perception of the problem situation.

Management of Rhomberg Bräsler firmly believe that, by attempting to transform the company into a 'World Class Manufacturing' organisation, 'problems' will be solved and production efficiency will improve. Management's initial perception of 'World Class Manufacturing' (Schonberger, 1986), presented to the staff of Rhomberg Bräsler in one of the open company meetings, as described earlier in this chapter, is shown in figure 1.1.

Figure 1.1 Management's initial perception of 'World Class Manufacturing'

In this introductory chapter, the nature and extent of the problem situation at Rhomberg Bräsler, has been briefly described. From my point of view, I have attempted to address the concerns and perceptions of both management and staff. I believe that the problem situation is based on issues regarding, amongst others, attitudes, relationships, trust, skills and communication. The criticisms of the company, from two MBA company analyses, have re-inforced my perception of the problem situation. Management has been aware of the problem situation and believes that the solution lies in the development of a 'World Class Manufacturing' programme, which will, in the long term, resolve all the pertinent

organisational issues. It is thus necessary to review the literature on World Class Manufacturing (WCM) in order to extract its essence and to provide a critique on its processes and its usefulness in the Rhomberg Bräsler context. However, it is first vital for the nature and process of management research to be reviewed, in order to provide a framework for this thesis.

CHAPTER 2

THE NATURE AND PROCESS OF MANAGEMENT RESEARCH

Before any manager, consultant or 'problem' solver jumps straight into any research process, it is necessary for him/her to understand the nature of the research that s/he is about to perform (i.e. 'What is management research?'). It is also vital for him/her to be familiar with the types of reasoning processes that s/he will engage in during the research, before deciding on a particular research methodology. This chapter explores and outlines the various reasoning processes, providing you with brief explanations of each, and then defines the path that this thesis follows.

Gill and Johnson (1991) express their concern that very few books have been written on research methods for use in business and management. This is especially pertinent, because initial difficulties in tackling research projects (especially in organisations), include establishing what research methods are available, which methods are applicable to which situations, deciding on which research approach to take and which methods to use to perform fieldwork.

The following headings characterise the different types of research, as presented by Gill and Johnson (1991):

- **Experimental research design.**

  The researcher tests theories/hypotheses systematically - usually possible only under laboratory conditions.

- **Quasi-experiments and Action research.**

  Quasi-experiments are similar to experimental research designs, but focus on real-life events. Action research focuses on problems and leads to some sort of action, causing an effect, which is monitored under controlled conditions. The research continues by studying the effects of the action.

- **Survey research design**.

  Research material is obtained from surveys, such as an analysis of the results of a questionnaire.

- **Ethnographic research**.

  Research material is generally obtained from observation and semi-structured interviewing. An ethnographic approach was taken in obtaining the research material for this thesis (Refer to chapter 10 for a more detailed explanation of ethnographic research and chapter 11 for a detailed account of the research at Rhomberg Bräsler).

The process of deciding on the most appropriate research approach at Rhomberg Bräsler and justifying the choice of research methodology, is first detailed in chapter 7. The steps that proceed throughout the stages of the thesis, are all based on reasoning processes, the nature of which will now be explained.

In any reasoning process, one always deals with a rule, a case and a result, defined by Minto (1982, p154), as follows:

"A Rule is a belief about the way the world if structured.

A Case is an observed fact that exists in the world.

A Result is an expected occurrence, given the application of the Rule in this Case."

There are three types of reasoning process that one can engage in. They are deduction, induction or abduction. The type of reasoning process one employs, depends on whether one starts with a rule, a case or a result. Explanations of these three reasoning processes follow.

Deductive reasoning begins with a rule (i.e. making a "statement about a situation that exists in the world"). The rule is then tested with a case (i.e. by making "another statement about a related situation that exists in the world at the same time"). The result can therefore be deduced or concluded (i.e. by stating "the implication of these two situations existing in the world at the same time"). The outcome of deductive reasoning is a "therefore" conclusion. (Minto, 1982, p55-57).

Inductive reasoning, however, begins with a case. A result is experienced. A rule can then be induced or formulated that the result is probably due to the case. Minto (1982, p55) states that "induction defines a group of facts or ideas to be the same kind of thing, and then makes a statement (or inference) about that sameness. In inductive reasoning the mind notices that several different things (ideas, events, facts) are similar in some way, brings them together in a group, and comments on the significance of their similarity." In essence, induction is "reasoning from particular cases to general conclusions." (Davidson *et al.*, eds. 1985, p492).

Abductive reasoning begins with a result. A reason for the result, or its cause, based on one's knowledge of the structure of the situation, is then formulated into a rule. The case is then used to check if the reason is valid. (Minto, 1982).

These three reasoning processes are illustrated in figure 2.1.

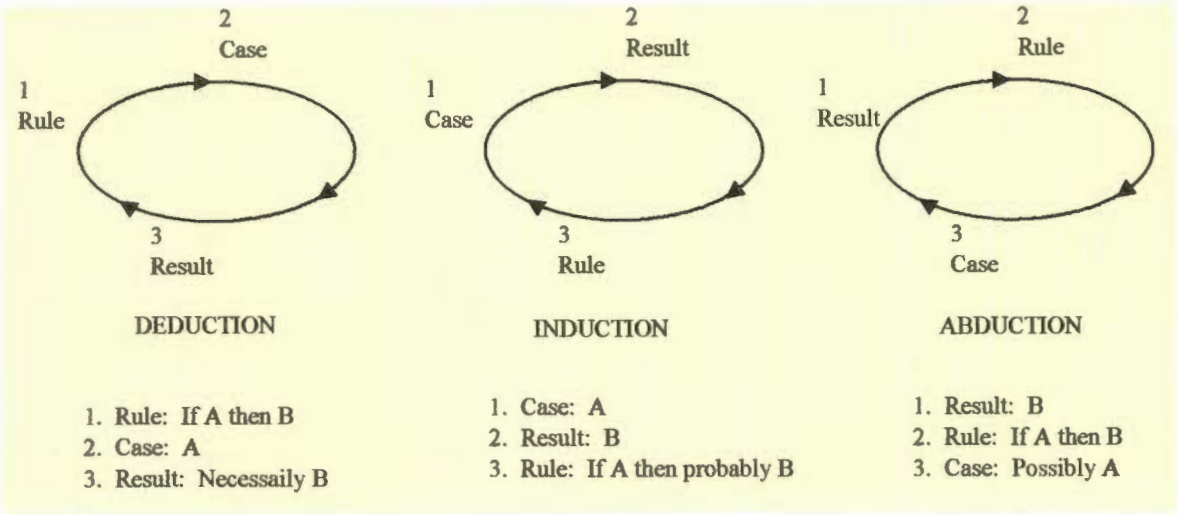


Figure 2.1 The Three Reasoning Processes: Deduction, Induction and Abduction (Minto, 1982, p154-155)

As is evident from figure 2.1, the Rule leads to the Case, the Case leads to the Result, and the Result leads to the Rule. In other words, the sequence of Rule, Case and Result is always the same. The type of reasoning used, only depends on what facts are initially known and where one starts in the reasoning process. However, Minto (1982) suggests that it may be likely in a complex problem-solving exercise, such as in this thesis, to use all three forms of reasoning in rotation.

The research process must also be seen as a learning cycle, which is illustrated by Gill and Johnson (1991, p24) as follows:

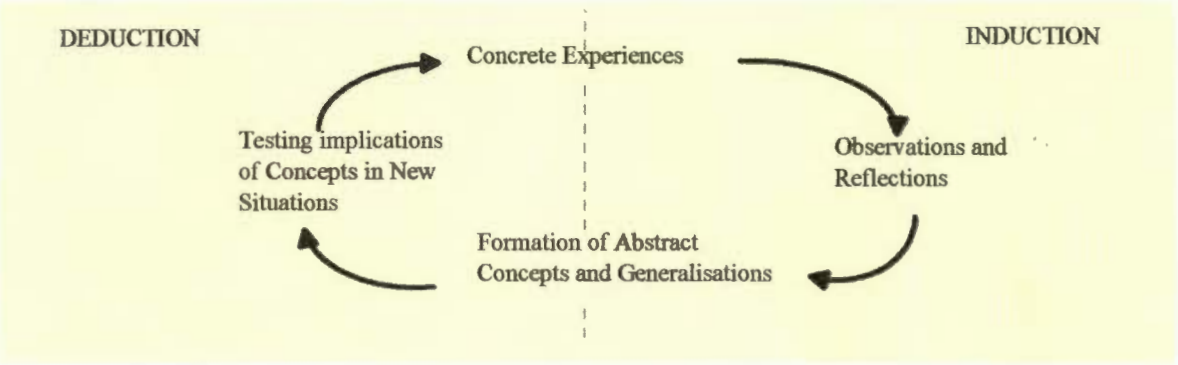


Figure 2.2 Kolb's Learning Cycle (Kolb *et al.*, 1979, cited by Gill and Johnson, 1991)

According to Gill and Johnson (1991, p25), when people provide statement or views, such as "Improved training provision will create a more productive, reliable and satisfied workforce", they are actually proposing a theory. This type of theory is characterised by an attempt at explaining an observation, resulting in a prediction or expectation. However, Gill and Johnson (1991, p26) define a theory as a "network of hypotheses advanced so as to conceptualise and explain a particular social or natural phenomenon". Thus, the theory described above regarding increased training, would more accurately be defined as a hypothesis.

In addition, by attempting to improve training and observing the outcome, i.e. improvements in terms of productivity, reliability and worker satisfaction, the accuracy of the theory can be evaluated. Gill and Johnson (1991, p25), however, add that the "outcome of the evaluation may be a retrospective change in the nature of the theory proposed so as to make it more accurate".

Research methods, according to Gill and Johnson (1991, p28), can be either deductive or inductive:

"A deductive research method entails the development of a conceptual and theoretical structure prior to its testing through empirical observation." Deduction corresponds to the left hand side of the learning cycle, illustrated above. Thus, by evaluating the accuracy of the 'training' theory, as described above, a result or outcome can be deduced.

In contrast to deduction, an inductive research method results in "the construction of explanations and theories about what has been observed." (Gill and Johnson, 1991, p33). Induction corresponds to the right hand side of the learning cycle, illustrated above.

Gill and Johnson (1991) also describe the research sequence, very briefly, in 7 steps:

1. Identify a broad area

2. Select a topic
3. Decide on an approach
4. Formulate a plan
5. Collect information
6. Analyse data
7. Present findings

However, the layout and reasoning process of this thesis is described as follows:

The thesis consists of two main cycles:

1. An abductive cycle
2. A deductive cycle

The Abductive cycle consists of three phases of reasoning, in the following order:

1. Abductive reasoning
2. Deductive reasoning
3. Inductive reasoning

Thus, different types of reasoning processes occur within the major cycle of this thesis. Bechhofer (1974, p73), cited by Gill and Johnson (1991, p 3) expresses that "the research process is not a clear-cut sequence of procedures following a neat pattern but a messy interaction between the conceptual and empirical world, deduction and induction occurring at the same time."

Minto (1982, p154) states that "analytical problem solving consists of noticing an undesirable Result, looking for its cause in our current knowledge of the structure of the situation (Rule) and testing whether we have found it (Case)." Minto (1982) follows on to say that this matches the Abductive reasoning process illustrated in figure 2.1.

Minto (1982, p158) describes the analytical problem solving process (or Abductive reasoning process), aimed at forcing one's thinking rigorously forward, to enable effective resolving of problems or issues. The process is outlined as follows:

"

1	What is the problem?	Visualise the difference between the result you get now and the result you want.
2	Where does it lie?	Visualise the structural elements in the present situation that could be causing the result.
3	Why does it exist?	Analyse each element to determine whether it is doing so, and why.
4	What could we do about it?	Formulate the logical alternative changes that could produce the desired result.
5	What should we do about it?	Create a new structure incorporating those changes that will produce the result most satisfactorily.

"

What has been performed thus far, in this thesis, is the identification of a broad area, as described as the 'problem situation' in chapter 1. This is the first step in the seven stage research sequence as presented by Gill and Johnson (1991). The problem situation at Rhomberg Bräsler, as described in chapter 1, can also be described as an undesirable result that has been noticed, which is the first step in the Abductive reasoning process.

In summary, there has been great concern that Rhomberg Bräsler, recently emerging from a 'family-like' business, into a small corporate environment, is not achieving the level of organisational performance that has been expected by management. Management has opted to employ a 'World Class Manufacturing' (Schonberger, 1986) program in an attempt to drive the company to improve its operations and performance.

Based on literature which follows in the next two chapters, the following rule, theory or hypothesis, is formulated:

For an emerging small company developing into a corporate structure, it is necessary for wide-scale organisational change to occur. However, this change must be managed systemically, taking the viability of the organisational structure and processes into account.

It is also imperative for the attitudes of the people of the organisation to change, before implementing changes that will be sustained.

Very short deductive reasoning, detailed as follows, then leads into the major portion of this thesis, where the rule is tested in the case - the Rhomberg Bräsler situation:

A small company that grows rapidly from a small operation into a corporate structure, will experience problems (or growing pains), unless organisational change is managed systemically, in terms of structure, processes and attitudes. Rhomberg Bräsler has grown into a corporate structure and is experiencing problems. Therefore, organisational change at Rhomberg Bräsler needs to be managed systemically.

Simply put, the deductive reasoning applied here is as follows:

If the hypothesis is true and if I understand Rhomberg Bräsler to be a company with a problem situation, as described in chapter 1, what are the implications for Rhomberg Bräsler?

What follows, is the testing of the rule formulated above, back in the case, i.e. by going through an inductive phase of applying Stafford Beer's Viable Systems Model (Espejo and Harnden, *eds*, 1989) and Peter Checkland's Soft Systems Methodology (Checkland, 1981) at Rhomberg Bräsler, each of which is detailed in the body of this thesis.

The outcome of the research is a set of rules, or proposals and recommendations, in terms of structure, processes and attitudes, which is then the basis of the last cycle of this thesis, which is deductive. Proposals can be considered as being rules for action.

These rules were tested against the opinions of the stakeholders at Rhomberg Bräsler. The importance of changes in structure, processes and attitudes during a process of organisational

change was reinforced, thereby proving the hypothesis true and demonstrating that the research performed at Rhomberg Bräsler, is ecologically valid.

At various stages during this thesis, a review of the literature is provided. 'Reviewing the literature' will "necessitate reading what has been written on the subject and gathering it together in a critical review which demonstrates some awareness of the current state of knowledge on the subject, its limitations, and how the proposed research aims to add to what is known." (Gill and Johnson, 1991, p21).

As we have already begun the first cycle of this thesis, wherein an undesirable result has been noticed, as described by the problem situation in chapter 1, it is necessary to take the next step in the research process - looking for the cause of the undesirable result in my knowledge of the structure of the situation. This knowledge is detailed in the chapters that follow, beginning with a literature review of World Class Manufacturing (Schonberger, 1986).

CHAPTER 3

LITERATURE REVIEW: WORLD CLASS MANUFACTURING (WCM)

3.1 OVERVIEW OF WORLD CLASS MANUFACTURING

All manufacturing companies require some sort of manufacturing strategy in order to produce their goods and services and to keep them abreast, or preferably, ahead of their competitors. This strategy should detail a strategic vision on "how the firm's productive resources relate to one another and to the environment". (Chase and Aquilano 1989, p843).

If one defines these relationships in terms of the 'notion' of World Class Manufacturing (WCM), then according to Chase and Aquilano (1989), the following should be achieved:

- Continual interaction with customers
- Continual interaction with suppliers
- Manufacturing through Total Quality Control (TQC)
- Use of Computer Integrated Manufacturing (CIM)
- Employment of Just-in-Time (JIT) production techniques

Hence, World Class Manufacturing is simply the collective name given to Japanese manufacturing techniques.

Schonberger (1986), who introduced the term 'World Class Manufacturing' ('WCM'), believes that the Western temperament is better suited to rapid and continuous improvement than that of the Japanese. He believes that managers of Western manufacturers have misused their "inquisitive minds" and their "innovative spirits" and that their biggest challenge is to "undo the harm, to change a work culture and unleash natural tendencies." (Schonberger, 1986, p16).

In a company claiming to be a World Class Manufacturer, all obstacles must be removed and as many operations as possible must be simplified. In short, the following are aims to be achieved:

- less buffer stock
- fewer suppliers
- fewer job classifications
- fewer inspectors
- less reporting
- shorter distances between operations on the production line
- smaller and more focused operations
- reduced part counts per product
- scheduling to rate and not by lots

In essence, according to Schonberger (1986), WCM encompasses the following:

- JIT (just-in-time) production - small lot sizes; ideal batch size = 1. "JIT production exposes problems otherwise hidden by excess inventories and stock". (Schonberger, 1982, p15).
- TQC (total quality control) - do it right the first time, i.e. zero defects. "Quality begins with production and requires a company-wide habit of improvement." (Schonberger, 1982, p47).

- TPM (Total Preventative Maintenance) - ensuring no mechanical breakdowns of machinery.
- Involving operators in activities that previously only involved supervisors, inspectors, technicians or managers. For instance, quality circles are aimed at improving quality and producti y through employee involvement.
- Improvement of supplier, customer, and labour relations.
- Effective and efficient shop floor layout and organisation. "Simplify, and goods will flow like water". (Schonberger, 1982, p103).
- Minimising transport of work-in-progress i.e. "travel light and make numerous trips". (Schonberger, 1982, p157).
- Improved product design, i.e. designing for simpler manufacturing.

World Class Manufacturing, interpreted by Maskell (1991, p4), "generally includes the following:

- A new approach to product quality.
- Just-in-time production techniques.
- Change in the way the work force is managed.
- A flexible approach to customer requirements."

What is described above, adequately encompasses what is involved in a company's quest for attaining the status of 'World Class Manufacturer', as defined by Schonberger and interpreted by Maskell and Chase and Aquilano.

My interpretation of 'World Class Manufacturing' principles, which could be applicable to the Rhomberg Bräsler context, is as follows:

- Re-design of the layout of the production line into manufacturing cells, to facilitate process flow, to improve communication and to reduce any bottlenecks. People in cells are usually in close proximity to each other, enabling visual checking of process

flow and early detection of errors. In addition, production supervisors' duties would be concentrated in one particular area, providing for better communication, instant feedback to production workers and to management, as well as quick and efficient problem solving on the production line.

- Line balancing, where each work station has an even flow of capacity, enabling work to flow through the cell without bottlenecks or idle time.
- Reduction of work-in-progress.
- Reduction of the size of batches - facilitated by attempting to manufacture only to order and not for stock.
- Procedures or failsafe mechanisms to detect errors early in the production cycle.
- Neatness and tidiness of the production line - Every tool and implement should have a designated place where it is stored when not in use.
- Multi-skilling of production workers.
- Self-checking - Operators need to check their own work, while they are performing their particular task in the production process.
- Simple visual displays comparing production targets with good production output.
- Reduction of set-up times of machines or operations.
- Development of in-house equipment and processes, as far as possible, before investing in expensive equipment.
- Reduction of component count per product.
- Simplification of as many production processes as possible.
- Reduction of the number of suppliers - develop a good relationship with them.
- Reduction of waste and non-value added activities.
- Improvement of quality in products and services (internal and external).

At face value, it appears that all the above principles could be simply implemented at Rhomberg Bräsler, resulting in miraculous improvements. However, any of the principles of World Class Manufacturing that management wishes to implement at Rhomberg Bräsler, will require the mutual co-operation and trust of everybody involved in the manufacturing process. It is therefore necessary to involve all employees in the development of a World

Class Manufacturing programme, right from the beginning. It must also be considered that the enthusiasm from everybody involved needs to be sustained for any change to be effective in the long term. The next two sections provide a critique of World Class Manufacturing, leading to issues regarding people involvement, commitment and trust, vital in any process of organisational change, such as World Class Manufacturing.

3.2 CRITIQUE OF WORLD CLASS MANUFACTURING

In his study of various organisations, Wilkins (1989) states that many of the companies have tried to implement generally praiseworthy ideas or practices from successful companies, such as quality circles, statistical process control, and just-in-time inventory reduction techniques. However, this resulted in cynicism amongst the employees, rather than the hoped-for productivity improvements.

He says that such new programs may fail to meet expectations for many reasons: the programs require different skills; they are not appropriate for the existing conditions; there are no rewards to motivate participation in these programs; or they threaten to give some people less influence. "Programs work in one setting because of a mix of personalities, specific historical conditions, widely shared values, organisational skills and supporting systems". There is no guarantee that they will work in another. "The skills and knowledge of firms are located in the habits, memories, skills, and commitments of groups of their employees. A myth among executives is that they can easily implement the practices of successful companies and reap their success". (Wilkins, 1989 p10).

As Wilkins (1989, P11) writes:

> "You cannot copy execution; you have to develop it through trial and error with motivated employees willing to make personal sacrifices and adjustments to achieve

> something distinctive. If this were not so, then no company should be interested in developing a distinctive organisational culture. That is, if it were easy to imitate the culture of IBM or Proctor & Gamble, then these firms would not have a competitive advantage. What they have developed in the way of a unique culture is a competitive advantage precisely because it is the product of years of careful building."

Results from Wilkins' (1989) study of companies in the USA using quality circles, indicated that most of the companies showed a great deal of excitement initially, but the motivation and enthusiasm began to dwindle. Managers stopped paying close attention to the groups and eventually showed no interest, due to the great deal of time required to support them, especially with regard to training.

Wilkins (1989, p13) insists that "unless managers are willing to adapt borrowed ideas and programs and struggle through the development of execution skills, they will see little improvement from applying the latest programs".

In summary, it is not likely that a company's management can just implement all the activities, procedures and principles pertaining to WCM and expect miraculous results. In other words, a 'recipe' for their implementation will not work.

As Schonberger has stated, extracted from the previous section, WCM includes :

- The improvement of supplier, customer and labour relations.
- A change of work culture and unleashing natural tendencies.

In addition, according to Maskell (1991, p4): "A change in the way the work force is managed" is required.

Hence, it is necessary to look at the 'people' side of issues; to take the 'human side' of an organisation into account and to consider their relationships. These issues are dealt with in the next section.

3.3 COMMITMENT TO PEOPLE INVOLVEMENT, MOTIVATION AND DEVELOPMENT THROUGH ORGANISATIONAL CHANGE

People are the active force in any organisation, according to Senge (1990). That is, it is mainly the people which constitute an organisation - without them, an organisation is virtually non-existent. He expresses that people have their own ways of thinking, which must be recognised by management. It is not necessary for management to constantly tell employees what to do. By encouraging employee involvement, people will be able to make more of their own decisions and will become more motivated. He also believes that everybody in an organisation should develop their own 'personal mastery' which is a process whereby one learns to generate and sustain 'creative tension' in one's life. Creative tension lies between vision (what one wants) and current reality (where one is relative to what one wants). Personal mastery can also be seen as the commitment of an individual to their own personal learning and to their own self-development. Senge (1990) expresses that people with high levels of personal mastery are more committed, they learn faster, they take more initiative and they have a greater sense of responsibility in their work. Hence, "many companies espouse a commitment to fostering personal growth among their employees because they believe it will make the organisation stronger." (Senge, 1990, p143).

Wilkins (1989) also tells of an American billion dollar manufacturing plant, where efforts to reduce costs and improve quality lead only to small improvements. Management came to the realisation that fundamental changes were necessary to remain competitive with their Japanese competitors, and thus began a process of "organisational and personal introspection" in order to determine the following:

- "How the existing character of their operations contributed to their difficulties in changing".

- "How they could best approach fundamental changes"

(Wilkins, 1989, p187)

They conducted interviews with people at all levels in the organisation, interpreted these interviews, as well as observations made and came up with solutions or opportunities for short and long term changes. Wilkins (1989) suggests how to uncover aspects of character in an organisation, that are usually taken for granted.

He defines the three components of organisational culture (or "character" as he calls it) as follows:

- Motivational faith in the fairness of managers and fellow employees as well as in the personal ability of the employees themselves and in the ability of the organisation.
- Shared vision, encompassing a concept of the business, a sense of identity, a philosophy of employee relationships and an orientation to shareholders, external regulatory agencies and the public.
- Distinctive skills that the organisation possesses as a result of its tacit customs, its network of experts and its technology.

Managers today are under much more pressure to cut costs and trim the fat. However, more critical in improving competitiveness, is the need to develop and maintain employee faith in the fairness and the ability of the organisation.

> "Motivation to stay with an organisation and give one's best to make the organisation successful is based on beliefs about the future, on faith. Employees use their understanding of history, the promises made to them, and their own predisposition to trust others to decide how much effort they will give to the organisation. If they have faith in the fairness and the ability of the organisation and in their own ability to make valued contributions, then they are very likely to be motivated to work for the good of the organisation. They assume that their own excellent contributions to the

> organisation will be noticed and rewarded appropriately. They therefore spend little time worrying about how to protect themselves and work hard to co-operate with others to make the organisation succeed." (Wilkins, 1989 p27)

Accordingly, it is clear that the recent majority union membership at Rhomberg Bräsler, as well as the lack of an implemented performance incentive scheme, indicates a loss of employee faith in the fairness of the organisation. Wilkins (1989) calls this ingredient of organisational culture: "social capital", which can be created or spent, just like financial capital. Therefore, it seems that Rhomberg Bräsler management has been spending more social capital than it has been creating.

Wilkins (1989) says when trust is lacking between people in an organisation, much effort and creativity goes into checking up on each other, producing cynicism and spreading rumours, rather than into constructively building the organisation.

He also says that it is important to determine the perspectives and beliefs that currently influence actions and choices made in the organisation. "We want to know the extent to which beliefs are shared and how they relate to changes the organisation needs to make." (Wilkins, 1989, p33).

"When there is genuine vision (as opposed to the all-too-familiar "vision statement"), people excel and learn, not because they are told to, but because they want to." (Senge, 1990, p9)

Senge (1989) also says that the gap between vision and reality can be discouraging, because it may seem that the vision is unreachable. However, this gap should be a source of creative energy to help one move toward their vision. This gap is labelled 'creative tension'.

> "In recent years, many leaders have jumped on the vision bandwagon. They've developed corporate vision and mission statements. They've worked to enrol everyone in the vision. Yet, the expected surges in productivity and competitiveness

> often fail to arrive. This has lead many to become disaffected with vision and visioning. The problem lies in our reactive orientation toward current reality. Vision becomes a living force only when people truly believe they can shape their future; change their current reality. The dominance of the "event mentality" tells people that the name of the game is reacting to change, not generating change. An event orientation will eventually drive out real vision, leaving only hollow "vision statements," good ideas that are never taken to heart." (Senge, 1990, p231).

In summary, the following has been suggested:

- To determine the level of motivational faith in the fairness of both one's superiors and peers, and in the ability of both the organisation and oneself.
- To determine the extent of the existence of a shared vision and to develop this shared vision.

The techniques and principles of World Class Manufacturing have been described and criticised. It is recognised that more emphasis needs to be placed on the 'human side' of any process of organisational change, such as World Class Manufacturing. It is realised that any principles of World Class Manufacturing that management wish to implement at Rhomberg Bräsler, will require the mutual co-operation and trust of everybody involved in the manufacturing process. It is therefore necessary to ensure full employee involvement in order for any changes to be effective in the long term.

The following chapter motivates the approach that was taken in this thesis at identifying and resolving organisational issues at Rhomberg Bräsler, thus far explained as a problem situation with World Class Manufacturing (WCM) as a panacea. WCM has been heavily criticised as an ineffective technique if implemented without commitment to people involvement and development, without motivation of, and mutual trust, between management and staff, without a change in management style, without a vision that is shared throughout the organisation and without a change in peoples attitudes.

CHAPTER 4

ORGANISATIONAL CHANGE - ADOPTING A SYSTEMS APPROACH

4.1 INTRODUCTION

This chapter serves to explain why a systems approach was adopted for this thesis, as well as why a systems approach is necessary for any program of organisational change or organisational development, such as World Class Manufacturing, to succeed. A systems approach basically deals with organisational issues, while conceptualising the organisation as a system. A simple definition of a system is a network of parts which interact together. It is the interactions that one focuses more importantly on, than on the parts themselves. This, however, only serves as a very brief explanation. 'Systems' and 'systems thinking' is covered in far more detail in chapter 5.

4.2 EMPOWERMENT AND LEARNING ORGANISATIONS

Management needs to realise the "importance of valuing and developing human resources and of promoting managerial styles that will empower employees to be innovative and self-organising and needs to encourage creativity, innovation and learning". (Morgan, 1988, pxiii).

Senge (1990) expresses the necessity to transform the traditional hierarchical organisation, where the 'top' thinks and the 'local' acts, into a learning organisation. In a learning organisation, every employee thinks and acts, creating 'localness'. "Localness means moving decisions down the organisational hierarchy and unleashing people's commitment by giving them the freedom to act, to try out their own ideas and be responsible for producing results." (Senge, 1990, p287-288). Thus, the concept of localness is the same as autonomy.

Argyris (1992) says that if organisations are able to learn, then they will be able to detect errors. These errors, i.e. the difference between what is planned for and what actually happens, can then be corrected, resulting in learning and the more effective the learning, the more the likelihood of innovation. The biggest barriers to learning in organisations today are organisational defences. An organisational defence, according to Argyris (1992, p2) is a "policy, practice, or action that prevents the participants (at any level in the organisation) from experiencing embarrassment or threat". Traditionally, in organisations, there are barriers to learning in terms of the accounting, budgeting, strategy and information systems functions, especially regarding their design and implementation. (Argyris, 1992). As Argyris (1992, p3) says: "I think it is fair to say that we are intentionally creating a world full of self-reinforcing, anti-learning processes that will overprotect the players so that it will be difficult to detect and correct difficult and embarrassing problems".

According to Argyris (1991), managers believe that problem solving results in learning. However, the way in which some managers 'solve problems' is a problem in itself, or causes more problems. Managers behave according to what Argyris calls their 'theories-in-use', i.e. the rules that make sense of their behaviour, and their learning can either be of a 'single loop' or 'double loop' nature. 'Single loop learning' occurs frequently in management, since it occurs within a theory-in-use. It is the day-to-day learning about organisational issues, such as the detection and correction of errors as described above. However, 'double loop learning' occurs when a manager is able to change his/her theory-in-use and hence his/her behaviour. Double loop learning is a change in the way one sees the world (i.e. a change in one's mental models or paradigms) and thus enables one to handle complex issues with far greater

dimension and understanding. It is double loop learning which managers need to develop in order to cope with today's complex world. According to Argyris (1991, p100) they need to look inwardly at themselves to "reflect critically on their own behaviour, identify the ways they often inadvertently contribute to the organisation's problems, and then change how they act." The essence of what is being described is learning to learn.

In order to foster positive organisational development, it is necessary to improve communication within the organisation, to create company-wide awareness of management's commitment to develop and improve the company and to embark on a long term process of changing management style and philosophy, as well as the organisational culture.

The organisational culture can only be developed if the higher order needs of employees are satisfied. "Traditional organisations are designed to only satisfy the first three levels of Maslow's hierarchy of needs, as illustrated in figure 3.1 below. Learning organisations help to address the higher order needs: self-respect and self-actualisation." (Senge, 1990, p347).

Figure 3.1 Maslow's Hierarchy of Needs

1. Detailed explanations of systems terms, such as 'systemic', are provided in chapter 5.

It has, thus far, been expressed by Morgan (1988), Senge (1990) and Argyris (1992) that the organisations of today need to develop their human resources to enable empowerment which should lead to increased motivation, innovation and learning. Widespread organisational learning, together with a change in management style and organisational culture, is necessary for organisational change or development.

4.3 A SYSTEMS APPROACH - PERFORMANCE AND EFFECTIVENESS

Ackoff (1995, p43) provides fundamental reasons as to why "popular panaceas", such as Total Quality Management (TQM) and Continuous Improvement (both World Class Manufacturing principles), more often than not, are ineffective in organisations. Ackoff's explanation which follows, conceptualises an organisation as a system, i.e. as parts which interact together, forming a whole. Firstly, panaceas "manipulate the parts of systems without regard to how their manipulations affect the whole through interaction of the parts." That is, they are not applied systemically[1]. Secondly, "they tend to do the wrong things 'righter' than doing the right things". To elaborate, Ackoff expresses that it is better to do the right thing wrong, which leads to learning. Making mistakes, enables learning and eventually leads to doing the right thing right. Doing the wrong thing right can only lead to reinforcement of error.

The following two sections further illustrate these two simple explanations.

4.3.1 PERFORMANCE BY WHOLE-ING THE PARTS

In an organisation, failure to 'whole' the parts, i.e. failure to manipulate parts of the whole with primary focus on the performance of the whole, and not on the performance of the parts involved, is anti-systemic. This means that while making any changes in an organisation, it is necessary first to consider the effect of the changes on the organisation as a whole, not only on the performance of the parts themselves, in isolation.

Ackoff (1995, p44) states that "the performance of a system is not equal to the sum of the performances of its parts taken separately, but is the product of their interactions. Therefore, improvement of the parts of a system taken separately may not, and usually does not, improve performance of the whole and often reduces it." He also provides an example to illustrate this point:

If one were to determine which production car has the best engine and which has the best gearbox, the Rolls Royce may be selected for the best engine, while the Mercedes for the best gearbox. However, if one attempts to couple the Rolls Royce engine to the Mercedes gearbox, they will not fit, and even if they did, they might not be effective in working together. Thus, the parts of a car need to be designed with the design of the whole car in mind.

Perhaps a better example of 'whole-ing' the parts, provided by Ackoff (1995), is the process that architects take in designing buildings. Consider an architect receiving a brief from a client to build a house. This brief would usually include an overall concept of the house, such as the number of rooms required, the approximate size of each room and special features that the client desires, all within a specified cost constraint. The architect does not commence by designing the perfect rooms, each in isolation and then try to put the whole lot together. S/he starts with what Ackoff (1995, p44) calls a "preliminary concept of the whole", i.e. sketches and calculations, considering the whole and just brief outlines of the

rooms, i.e. the parts. Only once the whole is fully conceptualised, are the parts, i.e. the rooms, themselves, designed.

Once the design of the whole building is complete and the architect decides to improve a part, s/he first considers how that change will affect the performance, or effectiveness, of the whole. It would be unwise to make the change, if the performance of the whole is not improved, even if the effectiveness of the part itself, improves. Architects may even decide to reduce the effectiveness of the design of a particular part, in order to improve the performance of the whole. (Ackoff, 1995).

The concept of 'whole-ing' the parts is called holism. Thus, the architect, as described above, uses holistic thinking, as opposed to reductionist thinking, where the performance of the parts would be optimised in isolation, without considering the performance of the whole (Checkland, 1981).

Ackoff (1995, p44-45) suggests the following rules of management of an organisation, considering holism as a primary management principle:

" 1. Allow any part to change itself in any way that does not affect the performance of any other part or the whole, provided the part has the resources necessary to make the change.

2. If the change a part wants to make affects one or more other parts and either improves or does not affect the performance of the whole, it is allowed to make the change if it obtains the agreement of the affected parts.

3. If it does not obtain the agreement of the affected parts the issue can be taken for resolution to the lowest level of management at which the parts converge.

4. If a part has the necessary agreement but does not have the necessary resources to implement the change, it must try to obtain the resources it requires from the lowest level of management that has the resources it requires.

Adherence to these rules requires continuous monitoring. It should be noted that these rules also operationalise the meaning of 'empowerment'."

Thus, while managing an organisation during a process of organisational change, it is necessary to apply principles of holism. It is necessary to involve the people from all areas of the organisation, since changes made will affect the performance of the whole. These management principles also allow for decision making to occur from as low down in the organisational hierarchy as possible.

4.3.2 EFFECTIVENESS - DOING THE RIGHT THING RIGHT

The second reason for panacea failure is simply 'efficiency' without 'effectiveness', i.e. doing the wrong things right. Effectiveness is doing the right thing right. Ackoff (1995) expresses concern that managers in organisations unfortunately focus mainly on efficiency, while remaining unaware that they may be doing the wrong thing. Ackoff (1995, p45) says: "The more efficient they become the more reinforcing they find their pursuit of the wrong thing. Continuous increases in efficiency require increases in knowledge and understanding, but continuous increases in effectiveness require wisdom, and wisdom is in very short supply". Argyris' examples of 'doing the wrong thing right' and of 'doing the right thing wrong', follow.

The concept of the automobile has not changed significantly since they were first produced. They still have four wheels and an engine and need to be controlled by a driver. However, the cars of today are very sophisticated, very fast and have very fuel-efficient engines. Thus one can say that the cars of today are very efficient. However, they are extremely ineffective. Traffic congestion and pollution are just two elements rendering the car, as a means of transport, extremely dysfunctional.

Car manufacturers, endeavouring to design smaller cars just for two, which are perhaps battery powered, are looking at ways of alleviating the problems of the today's road transport system. They are at least doing the right thing wrong, i.e. attempting to reduce traffic congestion and pollution levels (i.e. doing the right thing), while still using a car (i.e. doing it wrong).

4.4 SYNTHESIS

Ackoff (1995) says that the number of panaceas that are introduced to management today, can be somewhat overwhelming; each one of them promising to provide excellent results, which they inevitably do not. (Ackoff's reasons of failure are based on his own experience, as well as from the recent experiences of others, six of which have been written up in 1994). Ackoff (1995, 43) includes 'Learning Organisations' in his list of "alleged panaceas". However, I believe that 'organisational learning' is vital for empowerment, motivation and innovation. This is reinforced by Ackoff's expression that it is better to do the right thing wrong, which leads to learning, than the wrong thing right. Making mistakes, enables learning and eventually leads to doing the right thing right. This view of 'organisational learning', or of 'learning organisations', is also supported by Morgan (1988), Senge (1990) and Argyris (1992).

In addition, Ackoff's (1995, p45) suggested rules of management "operationalise the meaning of 'empowerment'." Both Morgan (1988) and Senge (1990) support this view.

Ackoff (1995, p44) states that the performance of a system, or an organisation, is the product of the interactions, or relationships, between the parts. The performance, or effectiveness, of this interaction is dependent on the level of motivation, autonomy, and culture of the employees of the organisation and the extent to which they believe in a shared vision. It is

necessary for double-loop learning (Argyris, 1991), as well as a change in organisational culture, to occur. This results in a change in people's attitudes and paradigms.

In a manufacturing organisation, activities required to perform the complete continuous cycle include the design of the product to be manufactured and the process by which it will be manufactured. The product proceeds from the design department through the production process to the customer through the sales and marketing department via the distribution network. The product also requires support out in the field. Thus, the chain starts with a customer need, which is translated into a product being designed, which in turn is produced with raw materials from suppliers and is eventually sold to the customer in order to satisfy his/her initial need. This, of course, is a very simplified illustration of what really occurs, but the essence of it, that which I want to emphasise, is that no activity in the chain can be performed in isolation. For instance, a change made in one link in the chain must affect what happens in another.

The importance of focusing on the interactions, or relationships, supported by the literature, is central to the notion of 'systems' and 'systems thinking', which is reviewed in the next chapter.

Hence, based on this literature, the following hypothesis, is formulated:

For an emerging small company developing into a corporate structure, it is necessary for wide-scale organisational change to occur. However, this change must be managed systemically, taking the viability of the organisational structure and processes, into account. It is also imperative for the attitudes of the people of the organisation to change, before implementing changes that will be sustained.

The hypothesis states that a small company that grows rapidly from a small operation into a corporate structure, will experience problems, unless organisational change is managed systemically in terms of structure, processes and attitudes. Rhomberg Bräsler has grown into

a small corporate structure and is experiencing problems. Therefore, organisational change at Rhomberg Bräsler needs to be managed systemically.

It is therefore necessary to take a systems approach to identifying and resolving the organisational issues at Rhomberg Bräsler. The major part of the remaining portion of this thesis deals with the choice of a suitable systems methodology which is applied at Rhomberg Bräsler, in an attempt to prove or disprove the hypothesis.

CHAPTER 5

LITERATURE REVIEW: SYSTEMS AND SYSTEMS THINKING

5.1 SYSTEMS - DEFINITIONS AND CLASSIFICATIONS

The Chambers Concise 20th Century Dictionary (1985, p1010) offers some definitions of the word 'system': "anything formed of parts placed together or adjusted into a regular and connected whole: a set of things considered as a connected whole: a group of heavenly bodies mainly under the influence of their mutual attraction: a set of bodily organs of like composition or concurring in function: the bodily organism: a theory of the universe: a full and connected view of some department of knowledge: a scheme of classification: a plan: a method: a method of organisation." (Davidson *et al.*, eds. 1985, p1010).

Our earth is part of a solar system. We, on earth, live within a political or social system, dwell in a housing system, go to work in a transport system and our bodies contain various systems such as the nervous system, the digestive system or the breathing system. What do all these systems have in common? They all consist of different parts which are richly interconnected together to form a whole.

As illustrated by the dictionary definitions above, Wilson (1990) says that depending on the context, the word 'system' has many different interpretations. However, in the study of systems and systems thinking, the concept 'system' is used as the basis for a modelling language, or as a basis for thinking about organisations and their problem situations. This concept will be explained further in the sections that follow.

In whatever context the word 'system', is interpreted, a system is a set or collection of parts or elements which interact with each other, functioning as a whole. According to Wilson (1990), a system is a set of elements that have a relationship with each other.

Wilson (1990) interprets the classifications of systems as follows:

- **Natural systems**, which do not need any human intervention, since they operate on their own, such as the weather system, the ecosystem or the solar system.
- **Designed systems**, which can be physical or mechanical in nature, such as an engine, or which can be abstract, such as mathematics, language or philosophy.
- **Human activity systems**, which are systems involving the purposeful activity of humans, such as man-machine systems (for example, a man driving a car) or political systems.
- **Social and cultural systems**, which include most human activity, such as a family, or a community, or a business enterprise. The parts of this type of system are the human beings themselves and the relationships between them are termed interpersonal. Wilson (1990, p25) draws the inference that social and cultural systems span "the interface between natural and human activity systems".

However, Beishon (1971) only identifies systems as such, if man has the ability to control or at least affect that system.

Systems, by Beishon's (1971) definition, have parts which are interconnected together in an organised and usually complex way and are identified by a human being as being of special interest.

5.2 THE STRUCTURE AND PROCESS OF A GENERAL SYSTEM - THE FORMAL SYSTEMS MODEL

The formal systems model describes the structure of a general system as well as its properties and provides a check for ensuring that a system complies with its necessary characteristics. Descriptions of the formal systems model appear in numerous places in the literature on systems, but I have extracted the following summary, primarily from Checkland (1981):

- The system must have an on-going purpose, i.e. a mission, which is essentially transforming its inputs into outputs.
- This transformation process needs to have a measure of its performance to determine if its outputs are being achieved efficiently and effectively. The outcome or behaviour of a part is often fed back to a preceding part in the system process, hence influencing the behaviour of the preceding part. This phenomenon is termed feedback and the information flow back to the preceding part occurs via a feedback loop.
- A system usually has control processes which include decision making.
- The elements or parts which make up a system are themselves systems exhibiting all the system properties.
- A system consists of inter-related and interactive parts, i.e. each part has a relationship with other parts and thus interacts with the other parts.
- Every system exists within, or is a part of a wider system, i.e. it exists in its environment with which it interacts.

- Every system has a boundary. This boundary has inputs from and outputs to the outerlying environment and can be "defined by the area within which the decision-taking process has power to cause action to be taken" (Checkland, 1981, p174). Hence, the transformation process is what occurs within the boundary.
- Systems have resources which are used in order to achieve the transformation process.
- Systems have some degree of long term survival or continuity and will generally recover after disturbances.

5.3 THE SYSTEMS APPROACH

Beishon (1971, p10) says that "the interest in behaviour is fundamental to the study of systems". "The distinguishing feature of the 'systems person' with his/her systems approach is that s/he is interested primarily in the behaviour of the total system which s/he has identified or defined". (Beishon 1971, p16). We, as people, are not naturally very interested in how the components of a system work. We are more concerned with the behaviour of the total system. The average person is not concerned whether or not the car s/he drives has an alternator to charge the battery and to provide electric power, but rather and more importantly, whether or not the car drives well and is problem-free.

Over the years, the disciplines of systems engineering and systems analysis have been developed. Scientists study complex systems and develop tools to analyse their behaviour and to gain more control over what happens in those systems.

However, what often happens, is the 'systems person' reaches a point where s/he has no further rules or strategies to guide him/her and s/he has to "search for possible solutions or ideas to meet particular needs". (Beishon, 1971, p51).

This is the point at which a systems design or a systems analysis is required. A systems design entails initiating a design of a system from scratch, whereas a systems analysis generally results from an existing problem situation.

As the perceived problems that Rhomberg Bräsler has been experiencing prevail mainly in the production department of the organisation, which can be conceptualised as a system, systems analysis will be discussed further in terms of Beishon's (1971) interpretation:

The existing system, for instance the production system within Rhomberg Bräsler, is presently perceived to be failing to meet its objectives because it has some sort of problem. However, it is important to carefully determine if the perceived problem is really the type of problem that is indicated.

Once the status of the problem has best been determined, Beishon (1971) recommends that one proceeds inwards into the subsystems of the system, as well as outwards into the environment of the system, while maintaining reservations. My interpretation of maintaining reservations is recognising that other perceptions of the problem situation do exist and that they may be diverse. The next step is to identify the subsystems and the relationships between them, and to build up a structure of the whole system. Looking outward at the system environment is also necessary to determine if there are any external feedback loops which enter the system at a lower and unexpected subsystem level.

According to Beishon (1971,p52), a systems analysis is complete when one has "discovered enough about the system to be able to predict its behaviour".

5.4 THE FOUNDATIONS FOR SYSTEMS THINKING

Checkland (1981) argues that systems thinking is founded upon the terms: "emergence and hierarchy" and "communication and control", which are explained as follows:

5.4.1 EMERGENCE AND HIERARCHY

A system has emergent properties, i.e. properties pertaining to the whole system which do not pertain to the individual parts which make up that system, or in other words, new attributes that none of its parts possess. It is easy to appreciate the emergence of a 'designed system'. Checkland and Scholes (1990, p19) offer an example: "The vehicular potential of a bicycle is an emergent property of the combined parts of a bicycle when they are assembled in a particular way to make the structured whole". Patching (1990) says it is more difficult to define emergent properties when dealing with 'human activity systems'. However, human activity systems have emergent properties which are the result of the interactions that are necessary for the system to function. These interactions are synergistic in that the parts of the system working together as a whole has greater value than the sum of the individual parts.

Systems, by definition, are made up of parts and are themselves subsystems of larger systems, forming a hierarchy of systems, with each system and sub-system exhibiting emergent properties. This hierarchy is, however, different from the traditional hierarchy with which most are familiar, such as the hierarchy in a large bureaucratic organisation. Hierarchy, in systems terms, embraces the notion of recursion, which defined by Flood and Jackson (1991), is the replication of the whole system in the parts of that system. This is explained further in the chapter 9, which deals with Stafford Beer's 'Viable System Model' (Flood and Jackson, 1991).

Checkland (1981, p78) expresses that a hierarchy consists of "levels of organisation". Each level is more complex than the levels below and has emergent properties that the lower levels do not have. Checkland (1981) illustrates this by considering the structure of an apple. The shape of the apple has no relevance to the system of molecules and the system of cells, that make up the apple. The shape is an emergent property of the apple itself, thus only being relevant at this high level of description.

In addition, one must limit the system by some sort of boundary. If we did not do this in real life, we would always have to deal with a system in terms of the whole universe. Hence, with every system under study, it is important to set a system boundary. Checkland (1981) considers the organism as a hierarchy of systems, starting with a system of molecules, then a system of cells, and leads up to a system of organs, which forms the organism. The organism, itself, forms part of the system, which is its environment. However, Checkland (1981, p76) believes that "in this hierarchy the organism itself seems intuitively to mark a boundary, organisms having an obvious identity as whole entities, in that they have a boundary which separates them from the rest of the physical world, even though there may be transports across the boundary."

However, in some instances, the boundary of a system may not be easily defined. Beishon (1971) illustrates this by examining a transport system. Consider the following scenario: If one of the railway lines in the transport system is unprofitable, it may warrant its closure. This could have serious consequences. Previously adequate bus services might become overcrowded, car sales and congestion on the roads may increase, and the wealth of the car dealers may also be increased. The lesson Beishon (1971) is trying to teach us, is that a transport system cannot be thought of as one railway line, because the system also includes the different modes of transport, as well as the reasons for people making use of them. Hence, systems boundaries might be wider than we anticipate. Thus, in employing systems thinking, one must try to anticipate and appreciate the interactions between parts of the system and their wider systems and know where to set the system boundary.

5.4.2 COMMUNICATION AND CONTROL

Summarising the previous section, systems have emergent properties functioning in a hierarchy, having parts which interact with one other. However, for this interaction to effectively occur, there needs to be communication between the parts of the system. This usually takes the form of information which is transmitted from one part to another and should be mutually understood.

Whatever system one deals with, one endeavours to constantly make improvements or changes to achieve a desired future state. As Beishon (1971, p33) points out: "Only a man can decide that he wants a certain future state to be brought about, only a man can set goals". Hence, control is the mechanism by which a future state is achieved.

According to Beishon (1971, p33), the essentials for control are:

" 1. A goal state.
2. A system capable of reaching that goal state.
3. Some means of influencing the system's behaviour."

If one draws an analogy with a temperature controller (i.e. intelligent thermostat), the following occurs:

1. The goal state is the setpoint, i.e. the temperature which we desire the controller to achieve in a process.
2. The system capable of reaching the goal state is the heater element which heats up the process to achieve the desired temperature.
3. The means of influencing the system's behaviour (i.e. output) is a sensor which measures the temperature of the process and compares the measured temperature with the desired temperature. The difference is the error signal. The influence is then the

varying amount of energy applied to the heater, depending on the magnitude of the error signal.

What is described above is the essence of feedback control, where one compares existing results with desired results set in goals. These goals are realised by bringing the results in line with the goals, i.e. the control process. Hence, feedback provides for system stability. However, "all control processes depend upon communication, upon a flow of information in the form of instructions or complaints." (Checkland, 1981, p88).

According to Checkland (1981, p84), " a link between control mechanisms studied in natural systems and those engineered in man-made systems is provided by the part of the systems theory known as cybernetics." He also describes cybernetics as the field of study encompassing communication and control theory. Thus, the foundations of systems thinking rest on cybernetics.

Briefly summarising the above, systems have emergent properties, functioning in a hierarchy, the maintenance of which requires processes, in which information is communicated, for purposes of achieving effective control.

5.5 SYSTEMS THINKING

Checkland and Scholes (1990) say that if the average person were asked to formulate the adjective from the word 'system', the inevitable response would be 'systematic'. However, there is another adjective derived from the word 'system', i.e. 'systemic'. The definition of 'systemic', as suggested by Checkland and Scholes (1990, p18) is: "of or concerning a system as a whole". Unfortunately most dictionary definitions of 'systemic' are physiologically related. The Chambers Concise 20th Century Dictionary (1985, p1010) offers the definitions

of the word 'systemic' as "pertaining to the bodily system or to a system of bodily organs: affecting the body as a whole". (Davidson et al., eds. 1985, p1010).

Patching (1990, p125) says:

> "Taking a systems view will not only facilitate learning as ideas are generated, but also encourage a more structured approach to investigative work. The link between the two adjectives **systemic** and **systematic** can be recognised here; the view taken of a human activity is a **systemic** one (i.e. regarding it as a system), which can result in the development of a **systematic** (i.e. methodical) approach to problem solving."

Systems thinking is simply a way in which one organises one's thoughts in a manner relating to the structure of, and relationships within reality. Systems do not actually exist in reality. Rather, the notion of a system is used as a means of conceptualising reality. As expressed earlier, in the study of systems and systems thinking, the concept 'system' is used as the basis for a modelling language or as a basis for thinking about organisations and their problem situations.

Checkland (1981) defines systems thinking as an alternative to the natural science paradigm, that is the use of systems ideas and concepts used to try and understand the world's complexity. Systems as a subject can be thought of as a meta-discipline whose "subject matter can be applied within virtually any other discipline". Checkland (1981, p5). A systems approach to solving problems endeavours to consider all views and perceptions and concentrates on the interaction between the parts of the problem and not so much on the individual parts themselves. In Checkland's words (1981, p59-60),

> "The crucial problem which faces science is its ability to cope with complexity. It is not nature which divides itself up into physics, biology, psychology, sociology, etc., it is we who impose these divisions on nature; and they become so ingrained in our thinking that we find it hard to see the unity which underlies the divisions".

Beishon's (1971, p30) view is that "the impact of systems thinking has arisen from the growing realisation that the specialist sciences and fields of study, from physics to sociology, cannot on their own provide answers to the many problems which man is now being forced to tackle". Thus, his view coincides with Checkland's, that real systems cannot be classified conveniently in one of the divisions of science.

Beishon (1971) also provides a good example of this. A man driving a car is a man-machine system. A man on his own can be classified in a physiological or psychological system and a car in an engineering system. However, the system 'man driving a car' crosses the boundaries. "The results of this interdisciplinary approach can be seen in the improvements of the design of car controls over the years". (Beishon, 1971, p30).

Kauffman says that in order to survive, we must understand the world around us. However, we cannot all be experts in every field. Thus, we need some way of dealing with the complex issues that exist in the world. His recommended approach is 'systems thinking', which may be difficult for the average person, inevitably trained in the traditional way, to understand. However, he tries to simplify his explanation by stating that systems thinking is rethinking things one already knows.

Kauffman presents results that systems thinking should achieve:

1. Learning new subjects will be easier, because the understanding of how systems operate is actually the basis for the rules of many subjects, such as biological systems, economic systems, social systems and political systems. Hence, if the principles of systems is understood before studying the other subjects, easier learning will result, since it is a matter of building on what one already knows.
2. Complex problems and situations should be more manageable since problems are dealt with while crossing the boundaries between different disciplines.

3. Even though correct answers are not guaranteed, chances of success at problem solving should be increased.
4. You should get "suggestions about effective strategies for influencing the world around you. When people see things they want to change, they often spend their efforts in ineffective ways", resulting in frustration. "A systems approach can help you identify 'high leverage points' in the systems where your efforts will have a greater chance of success". (Kauffman, pii).
5. "You will get some help in developing a comprehensive world view of your own", because a systems approach provides a "consistent frame of reference and a way of fitting the pieces together as you come to them". (Kauffman, pii).

Hence, it is necessary to discipline oneself to develop skills by which to apply systems or lateral thinking to complex unstructured real world situations which are generally holistic. A holistic system has properties which none of its parts possess. That is, it is not a reducible system. Consider the following as an example to explain the difference: Crime as a problem can be thought of as a reducible system: Crime results from factors such as poverty, boredom, etc., where the individual parts or factors can be optimised in isolation, thereby optimising the overall system, i.e. reducing crime. However, real life situations are not as simple. Considering crime in a holistic system, we should say that "the social system has, as some of its characteristics, a certain level of unemployment, illness, crime, wealth, etc. The critical assumption is that these are total system characteristics that cannot be much changed without changing the nature of the social system". (Clemson, 1984, p62).

Systems thinking is necessary to assist when dealing with complexity. Senge (1990) says that today, man can probably create far more information than anyone can absorb. Systems thinking enables one to see "structures" that underlie complex situations - to see patterns where others only see events. What is intended, is for one to take a holistic approach to problem solving (i.e. a shift of mind from seeing parts to seeing wholes).

Most problem situations in the world involve human beings in social roles, attempting to take purposeful action in order to improve a situation perceived as being problematic. Hence, according to Innovation Associates (1990) , systems thinking means:

- Recognising that problems arise from the interactions of different parts within a system.
- Integrating and synthesising diverse viewpoints to understand the whole.
- Focusing on the underlying structure of inter-relationships to maintain organisational functionality and to generate effective solutions to business problems.

Huse (1980), cited by Wilson (1990), summarises the essence of systems thinking as follows:

> "In a world that is rapidly changing, organisations need to become more adaptable and to better learn to manage change. From a systems point of view, change is enormously complex and can come from inside or outside the boundaries of the system. A major key to manage change is proper diagnosis of problems and situations, keeping in mind that the performance of the whole is not the sum of the individual parts, but is a consequence of the relationship of the performance between the parts. Thus problems can not be solved separately, since they are interdependent."

5.6 SYNTHESIS

In this chapter, the notions of 'systems', the 'systems approach' and 'systems thinking', have been introduced and explained. The type of 'systems' which are of most concern to the Rhomberg Bräsler context are 'human activity systems', which by definition, are systems involving the purposeful activity of humans. The nature of people's jobs at Rhomberg

Bräsler are purposeful, since they are aimed at achieving a contribution to the overall organisational performance.

'Systems' do not actually exist in reality. 'Systems thinking' enables an analyst to think about reality, with the use of the concept, structure and processes of systems.

The following two chapters, detailing the choice of systems methodology for use at Rhomberg Bräsler, lead into the detailed account of the use of Soft Systems Methodology (Checkland, 1981) at Rhomberg Bräsler, which clearly explains how the notion of systems is explicitly used in the process.

CHAPTER 6

LITERATURE REVIEW: TOTAL SYSTEMS INTERVENTION (TSI)

6.1 RE-DEFINING PROBLEMS AND PROBLEM SOLVING

Management today are trapped by their own assertions, says Flood (1993, p74), because:

"1 There is no such thing as a problem nor a solution.

2 There is no single problem solving approach correct for all circumstances.

3 There is no such thing as normal organisational life."

What Flood means is that problems are not easily definable. Thus, it is more appropriate to view 'problems' rather as 'messes', defined as "a set of interacting issues. A mess is characterised by compounding and related difficulties". (Flood, 1993, p76). Hence management and management consultants do not solve problems but rather manage messes. They do not solve problems and return the organisation to 'normal life'. The people in an organisation create the messes and management manage the messes.

Mess management is thus the dealing with the increasingly complex issues prevailing in organisations of today in an uncertain and changing environment. Management has limited

ability to deal with this ever increasing complexity and messes that are created and hence, the following questions as posed by Flood (1993, p78) are raised:

"1. How can we think creatively about the messes we create?
2. Which models and methods are appropriate to manage which issues, when and why?"

In today's world, people in organisations acquire more and more information and knowledge, but they lack *understanding*. In order to manage an organisation effectively, the organisation needs to be *understood*. Understanding a system, says Ackoff (1984), is the ability to explain the properties and behaviour of the system. Thus, people in organisations, with their information and knowledge, can survive by treating effects or symptoms, but without understanding, cannot control causes. Hence, understanding enables people to thrive by being able to plan, design and create a successful future.

However, Ackoff (1984) expresses that if one wants to try and understand something, one first needs a model, image or concept of that something. To think of, or about a complex system, such as an organisation requires the formulation of models or methods which are simple and easier to deal with, allowing for better understanding. People naturally formulate methods to deal with messes - different methods for different messes. What people often incorrectly claim, is that 'their method' will be suitable for most situations. However, this cannot be true because there is no such thing as normal organisational life. Organisations are dynamic and are constantly faced with ever-changing complex issues.

To quote Flood (1993, p101), there is a "new view which abandons the notion of problems and problem solving, replacing them with a continuous approach to creative mess management". This approach, proposed by Flood and Jackson (1991), is called 'Total Systems Intervention' or just 'TSI'.

6.2 TOTAL SYSTEMS INTERVENTION (TSI): AN INTRODUCTION

Total Systems Intervention (TSI) is designed to help choose an appropriate methodology for solving management problems as they are perceived, while still recognising that other perceptions of the problem are possible (such as the defined perceptions highlighted in chapter 1: 'Description of the Problem Situation'). "The essence of TSI is to encourage highly creative thinking about the nature of any problem situation before a decision is taken about the character of the main difficulties to be addressed." (Flood and Jackson, 1991, pxiii).

Organisations fail to perform well as a whole, when all the parts are independently optimised. Thus it is important to employ systems thinking in order to think about the interdependence of the parts that make up the system, each of which exhibit synergistic properties. (Flood and Jackson, 1991). This is achieved during TSI.

In essence, Flood and Jackson (1991) have introduced a systems-based approach to creative problem solving called Total Systems Intervention (TSI), changing traditional management assertions and dealing with the two questions posed in the previous section. TSI involves "creative thinking about messes using metaphors or models of organisations leading to informed choice about which methods can best tackle the issues surfaced during the creativity phase, ultimately leading on to implementation of specific change proposals according to those methods". (Flood, 1993, p79).

6.3 PHILOSOPHY OF TSI

Flood and Jackson (1991) state that the philosophy of TSI stems from a recent development in the systems movement, called 'critical systems thinking'. The foundations for critical systems thinking, i.e. "complementarism", "sociological awareness" and "human well-being and emancipation", according to Flood and Jackson (1991, p47), are thus also the philosophical basis for TSI. These three foundations are detailed in this section.

6.3.1 COMPLEMENTARISM

The term 'complementarism' is explained by Flood and Jackson (1991, p47) as follows: "Different methodologies express different rationalities stemming from alternative theoretical positions which they reflect. These alternative positions must be respected, and methodologies and their appropriate theoretical underpinnings developed in partnership". In other words, different problems solving methodologies exist, but it is necessary for each to be individually recognised in terms of its strengths and weaknesses, and thus its applicability to each particular situation. Hence, different methodologies can be used in a complementary fashion, addressing different organisational issues.

Complementarism can be further understood by comparing its standpoint with that of isolationists or pragmatists. Isolationists tend to employ only one methodology, regardless of the type of issues being faced with. The methodology used is usually the one which s/he has had the most experience with. On the other hand, pragmatists are primarily concerned with the use of a technique to solve problems or resolve issues which occur in practice. However, this approach usually does not lead to learning, but rather to the treatment of symptoms. According to Flood and Jackson (1991, p47), "learning can take place only if practice can be related back to a set of theoretical presuppositions which are being consciously tested through that practice".

6.3.2 SOCIOLOGICAL AWARENESS

According to Checkland (1981), real world problems may be 'hard', the solving of which entails finding an efficient means to achieve a defined end, or 'soft', where the goals themselves are undefined or problematical. The second foundation of TSI, i.e. sociological awareness, recognises that systems methodologies suitable for 'soft' applications should always be considered when human beings are involved. Flood and Jackson (1991) warn that hard methodologies entail one goal being privileged at the expense of others, whereas a soft approach aims at achieving results based on the outcome of constructive open debate - hence providing for sociological awareness.

6.3.3 HUMAN WELL-BEING AND EMANCIPATION

Flood and Jackson (1991, p49) ascertain that TSI is "emancipatory in that it seeks to achieve for all individuals, working through organisations and in society, the maximum development of their potential". People, naturally have an emancipatory interest in resisting power relations imposed on them and an interest in learning.

Work enables people to "achieve goals and to bring about material well being through social labour" (Flood and Jackson, 1991, p49). Interaction secures and expands the possibility for mutual understanding among all those involved in a social system. According to Flood and Jackson (1991), interaction is known as the "practical" interest.

Flood and Jackson (1991, p49) say that "if we all have a technical, a practical and an emancipatory interest in the functioning of organisations and society, then a management science which can support all these various interests has an important role to play in human well-being and emancipation". Both complementarism and sociological awareness, according to Flood and Jackson (1991), will provide for this.

Both the principles and the process of TSI, which are outlined in the following sections, are based on the philosophy of TSI just described.

6.4 PRINCIPLES OF TSI

Flood and Jackson (1991, p50) include the following principles embedded in the three phases of TSI, i.e. creativity, choice and implementation:

"
- Organisations are too complicated to understand using only one management "model" and a "quick-fix" is not sufficient to sort out their problems.
- Strategies and problems in organisations must be investigated using systems metaphors.
- Systems metaphors can be linked to appropriate systems methodologies.
- Different metaphors and methodologies can be used in a complementary fashion to address different aspects of organisations.
- The strengths and weaknesses of different systems methodologies are realised.
- The process of TSI is a systemic cycle of enquiry with iteration back and forth between the three phases."

These systems metaphors described above will now be introduced in order to explain their application in the three phases of TSI, i.e. creativity, choice and implementation, which will also be further explained.

6.5 METAPHORS/MODELS OF ORGANISATIONS

6.5.1 MACHINE METAPHOR (CLOSED SYSTEM MODEL)

Mechanistic models of organisations are the pre-systems theory traditional models of organisations, based on the view that organisations must be run like machines. That is, they can be completely understood because they can be broken down into definable parts, each of which can be analysed and understood and their behaviour can be explained. The assumption is made that if all the individual parts are understood then the whole system can be understood. Ackoff (1984) believes that this analysis is a process of aggregating the explanation of the parts into an understanding of the whole. What is described is the essence of reductionism. The system is thus closed to and unaffected by the environment. Work to be performed is analytically divided into different tasks and the people who perform those tasks are regarded as the replaceable parts of the 'machine'. Scientific methods are used to create the most 'efficient' breakdown of job descriptions of the workers. Flood (1993) says that management thus includes planning, organising, commanding, controlling and co-ordinating the parts in a bureaucratic hierarchy. A great deal of emphasis is placed on company policies, allowing little or no freedom or decision making on the part of the workers.

In today's complex business world, this type of model is clearly inefficient and considered unacceptable. Ackoff (1984) asserts that organisations today have to be continuously adapting and learning in order to remain effective. According to Flood and Jackson (1991), the only probable environment in which this type of model can be used effectively is in the military or large franchise operations.

6.5.2 ORGANISMIC METAPHOR (OPEN SYSTEM MODEL)

In contrast to the machine metaphor, the organisation considered analogous to an organism is a form of systems thinking. The organisation as a system is open to its environment. It operates under homeostasis, meaning that it constantly endeavours to maintain a constant environment internal to the organisation, in order to maintain the properties of the whole organisation. It is dependent on its external environment for resources so as to enable it to grow and survive. If this environment is changing, it needs to learn to adjust, adapt and regulate to maintain a steady-state. The management of the parts of the system is controlled via the outputs, hence the engagement in feedback control. Complex systems, such as organisms, consist of parts, but must be studied as a whole. According to Ackoff (1984), a system or organisation conceived organismically, makes the best of its future which is uncontrollable, but nevertheless predictable. However, in today's business world, the environment is highly unpredictable and thus reliable forecasts are rare. In addition, more emphasis is placed on efficiency and not so much on effectiveness. It is also necessary to improve the motivation of the workers in an organisation and their job enrichment or satisfaction in order to improve productivity.

It is useful to consider an organisation in organismic terms, especially in terms of adapting to a changing external environment which is complex and competitive. However, Flood and Jackson (1991) believe that it neglects the social side of an organisation. The organisation needs to promote people development and needs to be understood from the viewpoint of the people in the organisation. They also believe that relationships in organisations are often conflicting and the organismic view assumes harmony. In addition, this view does not provide for proactive development, since it is generally self-adjusting.

6.5.3 NEUROCYBERNETIC METAPHOR (VIABLE SYSTEM MODEL)

Flood and Jackson (1991, p10) write that the neurocybernetic[1] metaphor "emphasises active learning and control rather than passive adaptability that characterises the "open system" view". This metaphor draws an analogy between the organisation and the brain as a control system that can communicate with the parts of the system and has the ability to learn and plan for the future. It is a system which has a transformation process that is controlled by an activating unit via a control unit through an information system.

According to Flood and Jackson (1991), the neurocybernetic view is useful when learning, as innovation and creativity are required, especially in innovative industrial companies and consultancies. "It promotes self-enquiry and self-criticism and therefore the possibility of dynamic goal seeking based on learning". (Flood and Jackson, 1991, p11). However, they agree that this view neglects the fact that the purposes of the parts may not be the same as that of the whole system and that organisations are socially constructed.

6.5.4 CULTURAL METAPHOR

The cultural metaphor recognises that people in organisations, of different cultures, having different norms, values and beliefs, have vital roles to play in the organisation. It determines the ways of thinking and acting in an organisation and the way in which "organisations react to change" and "what changes are perceived to be feasible". (Flood and Jackson, 1991, p12). 'Culture management' is therefore important.

Continuing with Flood and Jackson (1991, p12), the culture metaphor "offers a new perspective on organisational change (i.e. instead of focusing exclusively on technology and

[1] Cybernetics is the study of automatic communication and control in functions of systems.

structure, a cultural perspective would also emphasise changing the perceptions and values of employees)".

However, attempts at changing culture need to be treated very delicately so that feelings of mistrust or manipulation are not created. In addition, it must be realised that culture change is long term. (Flood and Jackson, 1991).

6.5.5 POLITICAL METAPHOR

Flood and Jackson (1991) maintain that the use of the political metaphor assesses the political character of a situation in terms of issues of interests, conflict and power. The relationship between the people in an organisation can either be described as unitary, pluralist or coercive, determined by the degree of the individuals' competitiveness and pursuit for power.

Flood and Jackson (1991, p34) describe the participants of unitary relationships as having the following characteristics:

" - they share common interests;
- their values and beliefs are highly compatible;
- they largely agree upon ends and means;
- they all participate in decision making;
- they act in accordance with agreed objectives."

They also describe the participants of pluralist relationships as having the following characteristics:

" - they have a basic compatibility of interest;

- their values and beliefs diverge to some extent;
- they do not necessarily agree upon ends and means, but compromise is possible;
- they all participate in decision making;
- they act in accordance with agreed objectives."

Furthermore, Flood and Jackson (1991, p34) describe the participants of coercive relationship as having the following characteristics:

" - they do not share common interests;
- their values and beliefs are likely to conflict;
- they do not agree upon ends and means and "genuine" compromise is not possible;
- some coerce others to accept decisions;
- no agreement over objectives is possible given present systemic arrangements."

6.6 THE THREE PHASES OF TSI

6.6.1 SUMMARY

The three phases of TSI are creativity, choice and implementation, and are presented in summary form by Flood and Jackson (1991, p54) as follows:

" **CREATIVITY PHASE**

Task - To highlight aims, concerns and problems by determining which metaphors are most relevant to the problem as it is currently perceived.

Tools - Systems metaphors.

Outcome - Dominant metaphors highlighting major issues.

CHOICE PHASE

Task - To choose an appropriate systems-based intervention methodology or methodologies.

Tools - The "system of systems methodologies" where the relationship between metaphors and methodologies is determined based on the categorisation of the problem context.

Outcome - Dominant methodologies chosen for use.

IMPLEMENTATION PHASE

Task - To arrive at and implement specific proposals for change.

Tools - Systems methodologies.

Outcome - Highly relevant and co-ordinated intervention."

The three phases of TSI are now explained in more detail.

6.6.2 THE CREATIVITY PHASE

Flood and Jackson (1991) propose various different 'systemic metaphors' for helping managers to think creatively about problem situations. Each of these metaphors are to be used as "filters" through which to view the perceived problem.

Flood (1993, p95) says the sort of questions asked are:

" Which metaphors reflect current thinking about organisational strategies, structures, and control and information systems (including past present and future concerns)?
Which alternative metaphors might capture better what more desirably could be achieved with this organisation?
Which metaphors make sense of this organisation's difficulties and concerns? "

Different metaphors focus on different aspects within an organisation such as on organisational structure or on people aspects. "If one of the metaphors is dominant in bringing issues clearly into focus, then use of a systems methodology, which operates in a manner complementary to that metaphor, can obviously be recommended." (Flood and Jackson, 1991, p1). "The whole point of using systemic metaphors in the process of TSI, is to avoid the drawing of premature or narrow conclusions about the issues being faced." (Flood and Jackson, 1991, p43). The outcome of this phase is thus a dominant metaphor. However, there may be other metaphors which also highlight the organisation's difficulties and concerns. Both the dominant and other metaphor/s need to be applied in the choice phase.

6.6.3 THE CHOICE PHASE

The Choice Phase entails the use of "a system of systems methodologies". (Flood and Jackson, 1991, p31), which is described in this section. The objective is to choose a systems-based methodology / set of methodologies which is/are most suitable to the characteristics of the organisation revealed in the Creativity Phase as highlighted by the various systems metaphors.

The methodology/methodologies must be appropriate according to the following:

1. The nature of the system itself (e.g.. the organisation), and
2. The relationships between the participants (e.g.. management and staff).

Hence, it is necessary to categorise the nature of the system as either simple or complex, defined below, as well as categorising the relationships as either unitary, pluralist or coercive, as defined in the previous section.

Flood and Jackson (1991, p33) define systems as being either simple or complex, as follows:.

" Simple "systems" have the following characteristics:

- a small number of elements;
- few interactions between the elements;
- attributes of the elements are pre-determined;
- interaction between elements is highly organised;
- well-defined laws govern behaviour;
- the "system" does not evolve over time;
- "sub-systems'" do not pursue their own goals;
- the "system" is unaffected by behavioural influences;
- the "system" is largely closed to the environment.

Complex "systems" have the following characteristics:

- a large number of elements;
- many interactions between the elements;
- attributes of the elements are not pre-determined;
- interaction between elements is loosely organised;
- they are probabilistic in their behaviour;
- the "system" evolves over time;
- "sub-systems" are purposeful and generate their own goals;

- the "system" is subject to behavioural influences;
- the "system" is largely open to the environment."

The various different system methodologies can then be chosen according to whether the problem context is simple-unitary, simple-pluralist, simple-coercive, complex-unitary, complex-pluralist, or complex-coercive, while keeping in mind the underlying systems metaphors.

6.6.4 THE IMPLEMENTATION PHASE

This phase involves the actual employment of the chosen methodology within the problem context at hand. It is at this stage that 'total systems intervention' is realised. Flood and Jackson (1991, p52) express that the "dominant methodology operationalises the vision of the organisation contained in the dominant metaphor". In other words, improvements can be achieved by viewing the organisation in terms of the dominant metaphor. The outcome of the intervention is aimed at specific proposals for change in order to improve the problem situation in the organisation.

Other systems methodologies may also be used in a supportive role to the dominant methodology. "The logic of TSI demands that consideration continues to be given to the imperatives of other methodologies". (Flood and Jackson, 1991, p52).

As stated in the summary of the implementation phase of TSI, the systems methodologies are the tools required to operationalise this phase. As the following chapters deal with the choice, literature review and use of the most suitable systems methodology at Rhomberg Bräsler, a detailed account of the implementation phase of TSI is not required here.

CHAPTER 7

CHOICE OF SYSTEMS METHODOLOGY - TOTAL SYSTEMS INTERVENTION (TSI)

7.1 OUTCOME OF THE CREATIVITY PHASE

7.1.1 INTRODUCTION

While examining how different metaphors highlight different interests and concerns within an organisation, it is necessary to acknowledge that various approaches to "problem solving" exist and are available. In addition, each approach can be applicable to the same situation, depending on which issues are considered important or relevant. This expresses the need for complementarism eaning that there are different approaches to solving problems, but each approach must be recognised in terms of its strengths and its weaknesses. This must result in the use of the most suitable methodology for each particular situation. Flood and Jackson (1991) state that combining the general systems concepts (as described in chapter 5) with the five metaphors (described in chapter 6), enables the viewing of problem situations to be more coherent.

7.1.2 CREATIVE THINKING USING SYSTEMS METAPHORS

In order to make the best decision on a dominant and/or supportive metaphor, to aid in selecting the most appropriate systems based methodology for intervention at Rhomberg Bräsler, it is necessary to determine the following:

- Which metaphors reflect the current thinking at Rhomberg Bräsler regarding:
    - organisational strategies
    - structures within the company
    - control systems within the company
    - the company's information systems.
- Which metaphors might better capture what could more desirably be achieved at Rhomberg Bräsler.
- Which metaphors make sense of Rhomberg Bräsler's difficulties and concerns.

Thus, we need to think creatively, using different metaphors, by trying to determine when the metaphors are, or would be useful and when the metaphors are breaking down, or would break down in practice at Rhomberg Bräsler. Different metaphors focus on different aspects within the company. For instance, one metaphor could focus on the organisational structure and another on people aspects. Let us now ta a more in-depth look at Rhomberg Bräsler:

Rhomberg Bräsler is made up of different people. Needless to say, different people have different personalities. Over and above this, Rhomberg Bräsler is a melting pot of, amongst other factors, people of different nationalities, religions, sex and race. For instance, there are a number of British, German, Swedish and Swiss employees, both on a managerial and shop floor level. Thus, over and above differing personality types, it is clear that there are different cultures within the organisation, all of which have different interests and different perceptions of various situations.

Rhomberg Bräsler, like all other South African companies, is conducting its business in an equality based post-apartheid era. Hence it is necessary to acknowledge individual cultures, while developing and promoting a shared culture within the organisation.

Current management philosophy regards the use of the machine metaphor to view an organisation, as inappropriate, because it disregards the fact that human beings at work are intelligent individuals capable of making their own responsible decisions.

Over the past few years, the environment in South Africa has been especially changing and unpredictable, with the advent of the recession and the changing political structure. The future is just as unpredictable. One can view Rhomberg Bräsler in organismic terms, by considering the organisation adapting to a changing environment while trying to grow. However, in terms of a changing environment, adaptation is not sufficient for developing organisational effectiveness. An innovative organisation, such as Rhomberg Bräsler, needs to be proactive. It needs to anticipate changes in the environment and make decisions accordingly.

It is the perception that communication within Rhomberg Bräsler is not good, or rather that it is not at a desirable level. Thus, it would probably prove useful to view the organisation in cybernetic[1] terms in order to determine the existence and need for new and/or improved communication channels. If Rhomberg Bräsler embarks on a long term process of organisational change, it will be necessary to meet cybernetic criteria of viability.

Today, there is a great emphasis on organisational learning, which is necessary for fast growing industrial companies, such as Rhomberg Bräsler, so as to keep on the edge of technology, increasing the opportunity for innovation. Organisational learning, including single loop as well as double loop learning (described in chapter 3), is emphasised by the neurocybernetic metaphor.

[1] Cybernetics is the study of automatic communication and control in functions of systems.

Rhomberg Bräsler is a growing and dynamic company and management is set on changing the culture and processes within the organisation in the long term, to enable the company to develop along with its growth. However, management does realise that during this process, effective change will have to be the result of the commitment, involvement and enthusiasm of all employees within the organisation.

7.1.3 DOMINANT METAPHOR

Emerging from the creativity phase of TSI renders the **Cultural Metaphor** as dominant, based on my present perception of the problems currently being experienced at Rhomberg Bräsler. A cultural view offers a new perspective on organisational change. Instead of focusing exclusively on technology and structure, a cultural perspective emphasises the perceptions and values of employees. However, culture is something that takes time to evolve and cannot be changed overnight and may also lead, if not managed properly, to feelings of suspicion and mistrust.

Schein (1992) believes that many problems once viewed as communication failures or as a lack of teamwork, are now being better understood as a breakdown of intercultural communication. Today, many companies try speed up and improve processes, such as design and manufacture, so as to bring better products to the market sooner. To achieve this, it is realised that the co-ordination between marketing, sales, engineering and production functions, requires the understanding of the subcultures of each of these functions. In addition, it is necessary for intergroup processes to occur, so as to allow for the assurance of communication and collaboration across sometimes strong subcultural boundaries.

"Organisational learning, development and planned change cannot be understood without considering culture as a primary source of resistance to change." (Schein, 1992, pxiv). Thus, culture development is a pre-requisite.

According to Schein (1992), the culture of a group can be defined as the shared basic assumptions that the group has learned while solving problems of integrating within the group as well as adapting to external changes. It is these assumptions that have worked well enough to be considered valid and that are consequently taught to new members as the correct way to perceive, think, and feel in relation to those problems.

As a management consultant, Shein (1992) often didn't understand what was happening because his basic assumptions about truth and turf differed from the shared assumptions of the group members which he was dealing with. Thus, it was necessary to perform cultural analysis which is the encountering and deciphering of such shared basic assumptions.

"The concept of culture is most useful if it helps to explain some of the more seemingly incomprehensible and irrational aspects of groups and organisations." (Schein, 1992, p15).

7.1.4 SUPPORTIVE METAPHOR

I have also chosen the **Neurocybernetic Metaphor** or "Viable System" view as supportive to the cultural metaphor, because the neurocybernetic metaphor emphasises active learning and control and promotes creativity, self enquiry and self criticism and therefore allows for the possibility of dynamic goal seeking based on learning. (Flood and Jackson, 1991).

7.2 OUTCOME OF THE CHOICE PHASE

The first step is to determine the nature of the system and the relationships between the participants. If one considers the characteristics of Rhomberg Bräsler in terms of Flood and

Jacksons' description of complex systems, detailed in chapter 5, the nature of the system is definitely complex. The relationships between the participants, i.e. between management and staff, can be considered mostly pluralist, according to the definitions given by Flood and Jackson in chapter 5, regarding relationship categories. This is clear with respect to the problem definition as outlined in chapter 1. However, regarding certain issues at Rhomberg Bräsler that are generally agreed upon by management and staff, relationships can be considered unitary.

Flood and Jackson (1991, p53) provide the following table indicating how the various systems methodologies are related to the various systems metaphors. The appropriate methodologies for the different types of problem contexts, are also shown.

Systems Methodology	Problem Context	Underlying Metaphors
Systems Dynamics	Simple-Unitary	Machine Team
Viable System Diagnosis	Complex-Unitary	Organism Brain Team
Strategic Assumption Surfacing and Testing	Simple-Pluralist	Machine Coalition Culture
Interactive Planning	Complex-Pluralist	Brain Coalition Culture
Soft Systems Methodology	Complex-Pluralist	Organism Coalition Culture
Critical System Heuristics	Simple-Coercive	Machine Organism Prison

Table 7.1 Relationships between Systems Methodologies, Problem Contexts and Underlying Metaphors

Note that this table includes 'team', 'coalition' and 'prison' metaphors. According to Flood and Jackson (1991), the 'political' metaphor, when viewed at a higher level of resolution, contains unitary, pluralist and coercive perspectives. Each perspective is based on a metaphor, as follows:

- Unitary perspective - 'Team' metaphor
- Pluralist perspective - 'Coalition' metaphor
- Coercive perspective - 'Prison' metaphor

As we are primarily dealing with pluralist relationships in a complex environment, the problem context at Rhomberg Bräsler can be described as 'complex-pluralist'.

According to table 7.1, the two methodologies suitable for the problem context at hand, are Interactive Planning and Soft Systems Methodology. "These methodologies are designed to tackle contexts in which there is a lack of agreement about goals and objectives among the participants concerned, but where some genuine compromise is achievable (a pluralist situation)." (Flood and Jackson, 1991, p39).

Interactive planning (IP), according to Flood and Jackson (1991, p144) is a "methodology through which desirable futures can be planned and pursued", and "has as its operating principles that planning should be continuous, holistic and participative, and has, as its most original element, the ideas that the phases for the planning process should be centred around the design of an "idealised future". It is a methodology which effectively realises the insight of "plan or be planned for"."

Soft Systems Methodology (SSM), on the other hand is a methodology for intervention in a problem context, where the nature of the problem/s is undefined and any course of corrective action is unclear. According to Flood and Jackson (1991, p168) "SSM in action should prevent decision makers from rushing into poorly thought-out solutions based on preconceived ideas about an assumed problem."

Based on the nature of the problem situation, as described in chapter 1, as well as Flood and Jacksons' definitions of problem contexts and of the methodologies briefly described above, it is clear that the dominant methodology for use at Rhomberg Bräsler is Soft Systems Methodology (SSM). SSM assumes that the nature of social and organisational reality is

complex, as well as cultural and can undeniably help in pluralistic contexts by clarifying what could be done in the future to realise organisational development . (Flood and Jackson, 1991).

A Viable System Diagnosis of Rhomberg Bräsler can also be used in a supportive role, as, according to Flood and Jackson (1991, p230), it backs up SSM "in dealing with complexity because of its uniquely explicit understanding of brain related issues (learning, forward thinking, etc.)."

In Flood's words (1993, p118):

> "Viable Systems thinking enables an organisation to achieve customer requirements, to meet those requirements, to reduce waste, to manage issues, to plan management action, to help jobs to add value, to involve personnel at all levels across all functions, to attain meaningful measurement, and to achieve continuous improvement. Viable system thinking also allows for participation, autonomy, motivation, responsibility and creativity to be an integral part of organisational management."

As mentioned earlier, it would be useful to view Rhomberg Bräsler in cybernetic terms to determine the existence and need for new and/or improved communication channels. While Rhomberg Bräsler is growing and changing, it is imperative for the organisation to meet cybernetic criteria of viability. That is, the organisation needs to remain viable in terms of its structure and processes. Viable System Diagnosis is a means of determining this viability.

Since Soft Systems Methodology and Viable System Diagnosis have been chosen as the dominant and supportive methodologies, respectively, a literature review has been provided in the following chapters, prior to the actual research undertaken at Rhomberg Bräsler.

CHAPTER 8

LITERATURE REVIEW: SOFT SYSTEMS METHODOLOGY (SSM)

8.1 INTRODUCTION

In 1981, Peter Checkland gave the name to a new methodology which attempts to solve ill-defined problems: "Soft Systems Methodology" or just "SSM".

Checkland (1989, p273) offers his definition as follows: "SSM uses models of purposeful activity systems to set up a debate about change and learns its way to changes which would be both (systemically) desirable and (culturally) feasible". SSM employs systems thinking - "a shift from a paradigm of optimising to one of learning." Another definition is: "Soft Systems Methodology is a learning system which uses systems ideas to formulate basic mental acts of four kinds: perceiving, predicating, comparing and deciding on action" (Checkland, 1981, p17).

Checkland (1989, p288) also summarises the Soft Systems Methodology as follows:

> "SSM treats *what to do* as well as *how to do it* as part of the problem. It does so via the device of modelling systems which pursue a pure purpose from a declared point of view. It accepts that real-world action will be much messier than these pure

> models, and uses the models to structure a debate in which different conflicting objectives, needs, purposes, interests, values can be teased out and discussed. In this way it tries to encompass cultural myths and meanings as well as publicly testable facts and logic. It thus seeks to articulate a process in which an accommodation between conflicting interests and views can be sought, an accommodation which will enable action aimed at feasible improvement to be undertaken. This means that SSM is a learning, not an optimising system; learning has to be participative, so that SSM is not - or should not be - the skill of an external expert."

Flood and Jackson (1991, p167) express SSM as a way of "working with complex issues while acknowledging the subjective appreciations of human participants".

Flood and Jackson (1991, p168) state that "SSM has been developed for use in ill-structured or messy problem contexts when there is no clear view on what constitutes the problem, or what action should be taken to overcome the difficulties being experienced, and should prevent management from rushing into implementing poorly thought-out solutions based on their preconceived ideas about an assumed problem".

Patching (1990, p281) defines SSM in short as "a set of high-level guidelines for applying systems ideas to soft or unstructured situations, providing a general learning framework for problem-identification, normally prior to the application of problem solving techniques".

Patching (1990, p51) also provides a full summary the Soft Systems Methodology as follows.

> "SSM provides a set of guidelines for examining an organisation with a view to clarifying where improvements may be possible. It does not require strict adherence to procedures or rules, although there are certain constitutive and strategic rules which assist with its application in practice. The main difference between SSM and other approaches is the specific inclusion of system thinking stages. It makes an

explicit distinction between real-world and systems-world activity. Many of the actions taken by an analyst using SSM are conventional fact-finding activities. Although illustrated sequentially, the stages of SSM can be used in any order the analyst requires. It encourages a process of iteration as the analyst's knowledge increases. It encourages the analyst to examine the situation from a number of different viewpoints. It establishes the basis for a debate with the client about possible changes. It is essentially a participative approach, but can still be of value even if this participation is limited."

The definitions given here should give you some idea of what SSM is all about. What follows is an account of my interpretation and understanding of the philosophy, principles, features and process of SSM. But first, I present you with my own introduction to the subject:

The use of Soft Systems Methodology (SSM) in an organisation is intended to guide the process of solving problems within that organisation. The idea is to involve all those concerned with a particular problem situation, i.e. the participants, in order to try and 'solve' the problem, defined not by the company management, but as a result of analysing the opinions and perceptions of all those involved, i.e. opinions from executive management down to shop floor staff. The employment of SSM endeavours to facilitate the communication and debate of each of the perceptions of the system within which the perceived problem situation exists.

Flood (1993) says that this process of debate may change the attitudes of the participants as a result of their learning and understanding. This change of attitude alters their paradigm or allows them to escape from a certain mindtrap. Thus, "SSM is a learning, not an optimising system". (Checkland, 1989, p288).

8.2 BACKGROUND TO SOFT SYSTEMS METHODOLOGY

Checkland (1989) classifies traditional problem solving techniques in the following three categories:

1. Systems engineering
2. Systems analysis
3. Operational research, or management science.

These techniques all attempt to achieve pre-defined desirable objectives in the most efficient manner. Evaluation of alternatives could take the form of simulation or manipulating models of real world situations. In order to achieve this, the user engages in 'hard systems thinking'.

SSM emerged as a result of the incapability of hard systems thinking to solve certain management problems. Often in real life, objectives cannot have the same definition for, or be desirable to, all the people involved in the same situation. As Checkland (1989, p275 and 276) says, answers to the following questions: "What are the objectives? What are we trying to achieve? are themselves part of the problem". Thus SSM is a useful methodology in 'soft' or multi-perspective problem situations. In the words of Flood and Jackson (1991, p169), "SSM believes that problem situations arise when people have contrasting views on the "same situation". "What should be done?" becomes the main focus of SSM".

8.3 PHILOSOPHY OF SOFT SYSTEMS METHODOLOGY

The main philosophy behind SSM is the switch from a hard to a soft paradigm for use in resolving organisational issues.

Checkland (1981, p161-162) stresses that SSM is not a method or a technique, but rather a "set of principles of method where in any particular situation have to be reduced to a method uniquely suitable to that particular situation. Where a technique tells you 'how' and a philosophy tells you 'what', a methodology will contain elements of both 'what' and 'how'". Checkland and Scholes (1990, p285-287) also emphasise that SSM is a methodology, not a technique, and "every use of it will potentially yield methodological lessons in addition to those about the situation of concern". SSM "will never be independent of the user of it, as is technique". A technique is a procedure which should deliver guaranteed results, providing that it is administered correctly.

The aim of SSM is to generate learning amongst the participants of a perceived problem situation, as a result of eliciting the different perceptions of the problem from the participants' perspectives. However, Flood and Jackson (1991, p168) say that "SSM is best employed in pluralist contexts, where there is a basic compatibility of interests, where values and beliefs of participants diverge and yet where genuine accommodation and compromise is possible".

Checkland cautions, as interpreted by Flood and Jackson (1991), that in attempting to solve real world problems in terms of "systems", one must be careful not to "look" for systems in one's investigation. "Systems" as a concept should only be used to aid the problem solver in organising his/her thoughts. It must be understood that real world problems occur in socio-technical situations, where, like at Rhomberg Bräsler, different cultures predominate. Social situations should be understood in terms of 'verbs' (i.e. words that describe actions). Thus, when choosing these verbs, one must consider the different cultures, each with their own social practices and different ways of doing things.

This all leads to the understanding of social dynamics, which is concerned with people of different cultures who have different interpretations of issues and how the people of these cultures interact with one another. This interaction often leads to conflict, resulting from

these differing interpretations. The use of SSM aims to reduce this conflict by assuming that these interpretations can be altered by developing mutual understanding between the people of different cultures. Hence, it is social dynamics that must be recognised in terms of systems thinking - analysing and developing the relationships between the parts of the system (eg. between the people involved) and not the optimisation of the individual parts.

8.4 PRINCIPLES OF SOFT SYSTEMS METHODOLOGY

Flood and Jackson (1991) suggest four principles that one should take cognisance of when using SSM as a problem solving methodology. They are:

- Learning
- Culture
- Participation
- Two modes of thought,

and are described as follows:

Learning

SSM is a continuous never ending process because learning is generated through the use of the methodology in a particular problem situation. This learning changes the nature of the problems being studied, or rather, the different perceptions of the problems and results in a new or developed situation, with new perceptions, which can be further developed through continued learning.

Culture

By employing SSM, any resulting proposals must be relevant to those involved and should be systemically desirable as a result of applying systems thinking in the process. More

importantly, actions must be culturally feasible. This principle stems from the philosophical premise of SSM because the real world has organisational and social constraints within which proposed actions must lie. Systemic desirability and cultural feasibility are described later in this chapter in the section headed: 'The Process of Soft Systems Methodology'.

Participation

The successful use of SSM requires participation. Without participation, one cannot assess different perceptions of a problem situation and this renders the outcome of an intervention invalid or inaccurate. The essence of SSM is achieving synthesis of varied perceptions of a problem situation, by different people, and as a result, establishing an arena for learning and understanding, thus enabling improvement of the problem situation.

Two modes of thought

The process of SSM, as described in the next section, requires thinking **in** the real world as well as systems thinking **about** the real world. This distinction may not yet be clear. Thinking in the real world involves trying to understand a particular problem situation based on as many different perceptions as possible. Systems thinking about the real world involves developing different ideal models of systems in the real world in order to compare them to the actual real world situation. These two modes of thought are also explained further, later in this chapter, in the section headed: 'The Process of Soft Systems Methodology'.

8.5 FEATURES OF SOFT SYSTEMS METHODOLOGY

After much of his experience using SSM in various different organisations during the 1980's, Checkland (1989, p278) describes the main features of SSM as follows:

SSM is a form of management. Management is defined as a "process of achieving organised action", entailing "deliberate, thought-out action" and not "random thrashing about"

"Anyone who is a manager in any field of activity is reacting and trying to cope with an ever-changing flux of interacting events and ideas". This means that a manager has his/her own perceptions and evaluations of the flux and decides to take action as a result thereof. The whole process is never ending because this action leads to a new perceptions and evaluations, and even further action. Hence, it is a cyclical process.

SSM is also an enquiring process. What is important to note here, is the acknowledgement that different people will have different perceptions of, will make different evaluations of and will take different actions in the same situation. Strümpfer presents an image of a dense bush, which represents the situation. The enquiring process entails eliciting different perceptions of the situation. Different vantage points around the bush are then defined from which different parts of the bush are viewed. Each vantage point views a different part of the same whole, i.e. each one represents different perspectives of the same situation.

Any real world situation in which humans are involved, interacting together, can be called a "human activity system". Most human activity systems are aimed at achieving a certain purpose and can hence be termed 'purposeful human activity systems'. Checkland (1989), for example, says if you ask different people to describe or define a prison as a purposeful human activity system, each one would respond differently. A prison could be described as a rehabilitation system for people serving a prison sentence, or as a punishment system for criminals, or as a system to protect society from criminals. There will always be "multiple possible descriptions of any named real-world purposeful action". In addition, "any description of purposeful activity which is to be used analytically will have to be explicit concerning the world which that description takes as given". (Checkland, 1989, p279). It is clear that a given description will stem from a certain 'worldview'. In later sections it will become even clearer that in the process of SSM, this worldview is termed 'Weltanschauung', offering a better understanding of the term, which Checkland (1989, p279) defines as the "stocks of images in our heads, put there by our origins, upbringing and experience of the world, which we use to make sense of the world and which normally go unquestioned".

Figure 8.1 models the concept of a human activity system, taking into account the structure and process of 'the formal system', as described in section 5.2 of chapter 5.

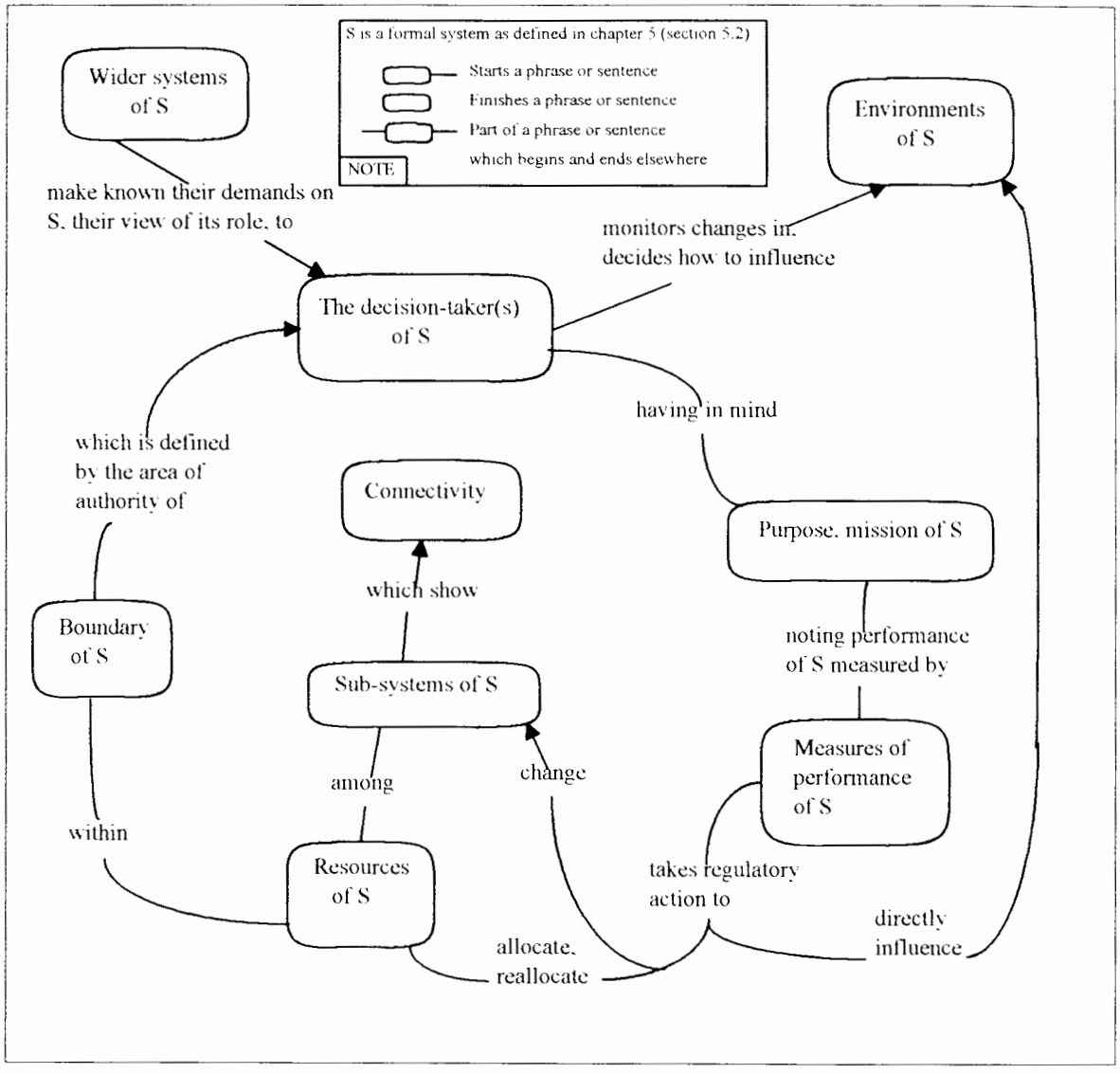


Figure 8.1 A Model of the Concept 'Human Activity System' (from the point of view: taking purposeful action in pursuit of a purpose or mission). (Checkland, 1981, p175).

While employing SSM, it is necessary to describe different human activity systems "in relation to a particular image of the world". This is performed through an enquiring process where "pure models of purposeful activity" are compared to "perceptions of what is going on in a real-world problem situation". Checkland (1989, p279). Thus a prison could be

improved by taking action based on individual comparisons made between what goes on inside the prison and activities in a set of different models such as a rehabilitation, punishment or protection system. In Checkland's words (1981, p215): "Whether we realise it or not we view raw data via a particular mental framework, or world view. We observe people voting and see, not 'marks being made on pieces of paper' but 'human beings taking part in the democratic process'".

8.6 THE PROCESS OF SOFT SYSTEMS METHODOLOGY

8.6.1 INTRODUCTION

People generally make decisions and take action based on personal experience. Checkland (1989) does not reject this, but says that experienced-based decision making is supplemented by using SSM, because SSM employs explicit use of systems thinking.

SSM has the following stages, which are mentioned briefly and then explained in detail.

1. **Finding out: Start** with a **problem situation unstructured**.
2. **Work** towards a **problem situation expressed**.
3. **Define relevant human activity systems** as **root definitions**.
4. **Develop** a **conceptual model** from each root definition.
5. **Compare** each conceptual model with **reality**.
6. **Debate** and **propose** potential **improvements** or changes.
7. **Take action** to implement improvements or changes.

Figure 8.2 illustrates the sequence of the stages of the Soft Systems Methodology process.

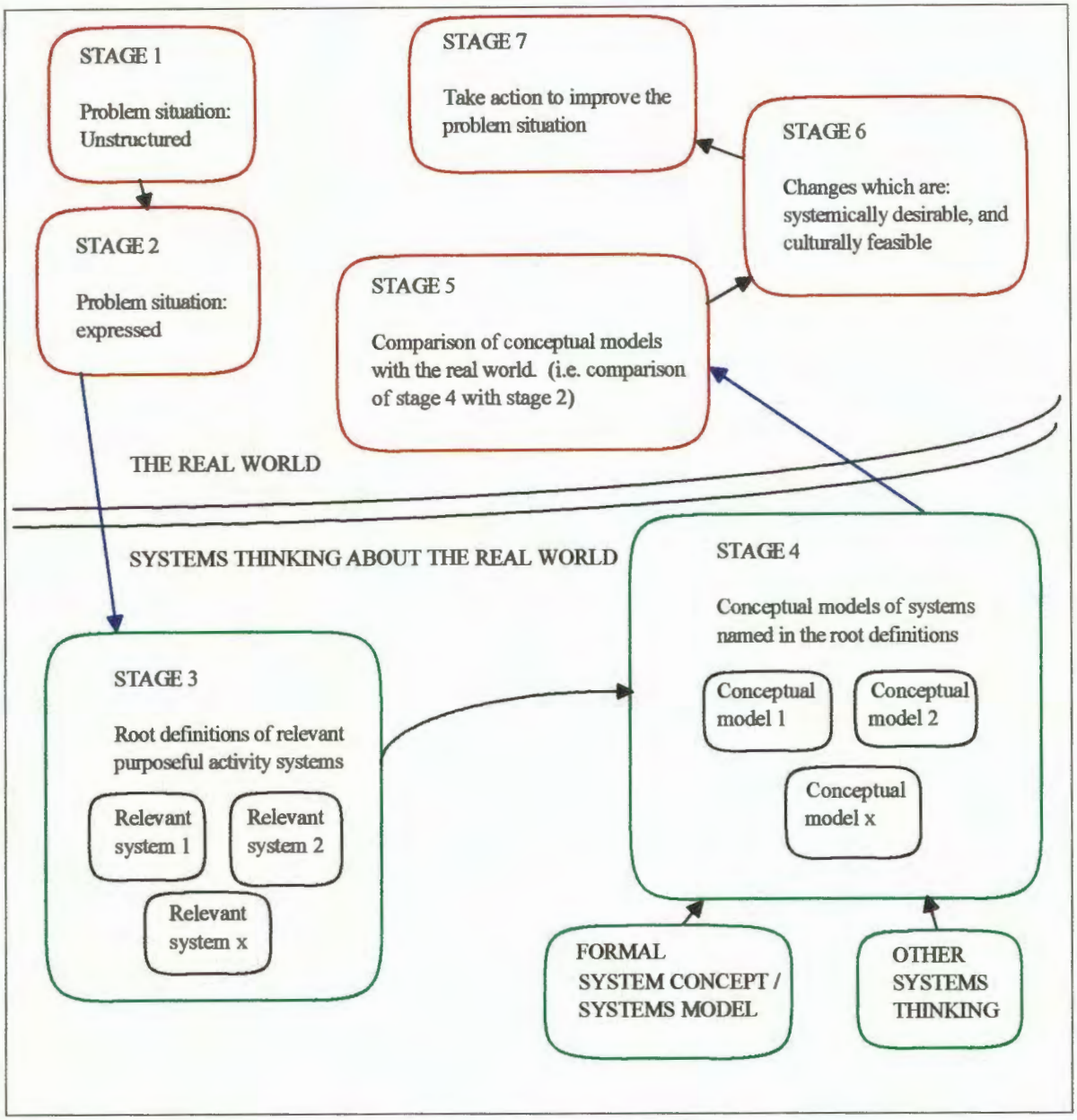


Figure 8.2 The Process of Soft Systems Methodology (7 stage model)

As is evident in figure 8.2, stages 1, 2, 5, 6 and 7 take place in the real world and involve the people involved in the problem situation, whereas stages 3 and 4 are 'systems thinking' activities pertaining to the real world, performed by the 'systems analyst'. These seven stages are not strictly intended to be used in the sequence shown above, as long as the 'systems' analyst is always completely aware of the switch made when transferring between being

involved in the real world and thinking about possible systems in the real world (Checkland, 1981).

As Checkland (1981, p223) articulates: "The most important attribute of the good systems thinker is his/her ability to entertain a wide range of possibly relevant systems, to take his/her choices seriously and to model them meticulously, but to do so without owning them psychologically".

8.6.2 STAGE 1: FINDING OUT

The process of SSM begins with 'finding out' about the situation in which a problem is perceived. This must be done while attempting not to "impose a particular structure on it" (Checkland 1981, p165). Flood and Jackson (1991) suggest gathering information by observation, collection of secondary data, and through informal interviews. Checkland (1981) recommends that at this stage, as many perceptions of the situation should be obtained from as wide a range of people involved in the situation, without analysing the results in terms of systems. However, he warns the 'problem solver' or 'systems analyst' that his/her personality traits, experience, knowledge and interests will affect what s/he regards as significant. (Checkland, 1989).

8.6.3 STAGE 2: PROBLEM SITUATION EXPRESSED - HUMAN ACTIVITY SYSTEMS

According to Checkland (1989), finding out and expressing the problem situation can take the form of one of the following:

1. Building a rich picture. (Patching, 1990, p262) says that the term 'rich' implies that "the pictures should contain a wealth of information relevant to the study; however, trying to include too much detail can result in them becoming extremely cluttered, and it is often necessary to summarise the detail and redraw them as the study progresses").
2. Using SSM itself.
3. Building a rich picture through three analyses.

The original way of expressing a problem situation, as explained by Checkland (1981) and Flood and Jackson (1991) is to draw up as rich a picture as possible , not of 'the problem', but of the situation in which there is perceived to be a problem. Patching (1990, p262) suggests that stage 2 of SSM is the "process of exploring a situation and expressing the main factors as a rich picture". The information for these pictures is taken from observing slow-to-change structure within the situation and continuously changing processes, by forming a view of their relationship. However, users of SSM have found these guidelines too abstract. (Checkland 1989).

Another way of 'finding out' (i.e. stage 1 of SSM), is to use the process of SSM itself. However, Checkland warns that "this approach has been successful in many cases but suffers from the disadvantage that it can tend to channel subsequent thinking in only one (somewhat boring) direction, namely improving the efficiency of existing operations". (Checkland, 1989, p281).

As explained by Checkland (1981) and Flood and Jackson (1991), more recent applications of SSM perform three specific related analyses which should yield a rich picture:

Analysis 1 takes the intervention in the situation as its subject matter. The 'clients' (who initiates the intervention) and the 'would-be problem solver' (the analyst) is then identified. The problem-solver then compiles a list of 'problem owners', usually including the client.

Analysis 2 is culture based, seeing the problem situation as a social system by establishing significant social roles, expected norms of behaviour and performance values.

Analysis 3 is politically based, establishing where and how power is apparent in the situation and how it is wielded, for example through role-based or charismatic authority, privileged access to certain information, or command of resources.

The outcome of using any of the above ways of finding out and expressing the problem situation, should be the emergence of a number of themes or relevant viewpoints. These can be identified as relevant and purposeful "human activity systems", which can be, according to Checkland and Scholes (1990), one of two types, :

- 'Primary-task' system
- 'Issue-based' relevant system

A primary task system is the choice of a notional human activity system whose boundary coincides with that of real world purposeful action organised in a particular way. It is possible that certain functional divisions at Rhomberg Bräsler will be able to be mapped to certain primary task systems.

However, within Rhomberg Bräsler, "as in any organisation undertaking a portfolio of different tasks, there will always be debate about its core purposes and about the fraction of resources which should be devoted to each." (Checkland and Scholes, 1990, p31). This necessitates the formulation of issue-based relevant systems which cannot be mapped directly onto real world systems, i.e. their boundaries cannot be mapped onto any real world organisational boundaries. An example of such a system could be: 'a system to improve information flow', which one would not expect to find in any real world organisation. Checkland and Scholes (1990, p32) express that issue-based systems "are relevant to mental processes which are not embodied in formalised real-world arrangements".

8.6.4 STAGE 3: FORMULATING ROOT DEFINITIONS

It is at this stage, in the use of the methodology, that a switch is made from the actual activities in the real world to systems thinking about the real world. For each relevant human activity system identified at the end of stage 2, a "**root definition**" (i.e. an idealised view of what a relevant system should be) must be formulated, which determines "what is to be done, why it is to be done, who is to benefit or suffer from it and what environmental constraints will limit the actions and activities" (Flood and Jackson, 1991, p175). What the root definition (RD) actually defines, is a transformation process occurring in a set of purposeful human activities, i.e. the core purpose of the activity system.

The root definition should comprise of the six elements of the mnemonic: "C A T W O E", explained as follows:

Customers, who are the victims or beneficiaries of the purposeful activity.
Actors, or humans who perform the activities of the purposeful activity.
Transformation process, which changes a defined input to a defined output.
Weltanschauung (world view), which makes the definition meaningful.
Owners of the activity system, who can put a stop to the activity.
Environmental constraints, which the system takes as given.

It is important to note that a root definition of a relevant human activity system is not always of a primary or officially declared task, or of a department or function that exists in an organisation. To illustrate, an "issue-based RD might express the idea of 'a system to resolve conflicts on resource use'. You would not expect to find a 'Department of Conflict Resolution' in the organisation" (Checkland, 1989, p283). In summary, stage 3 should yield both primary task and issue-based root definitions of purposeful human activity systems.

It is also important to note that individual root definitions must be formulated for each Weltanschauung considered relevant

8.6.5 STAGE 4: BUILDING CONCEPTUAL MODELS

A "**conceptual model**" must be developed from each root definition, which "is an account of the activities which the ideal system must do in order to fulfil the requirements of the root definition" (Flood and Jackson, 1991, p176). Checkland (1981, p164) says that "a structured set of verbs is assembled which describes the minimum necessary activities required in a human activity system which is that described by the root definition."

It must still be remembered that this stage only involves systems thinking about the real world and the builder of conceptual models must beware of describing actual activity systems that s/he knows exist in the real world.

In simple terms, the conceptual model describes what the idealised system **does**, and must be constructed from the root definition, which tells what the system **is**. The root definition describes a transformation process which must now be modelled as a system of activities needed to achieve this process. The number of activities or verbs decided upon, is usually from 5 to 9, and should be placed in sequence, i.e. in dependency order. Hence, if activity 2 is dependent on activity 1, it must be placed after activity 1, with an arrow going from activity 1 to activity 2.

When conceptual models are drawn, the formal systems model should be consulted to ensure that the system model complies with essential system characteristics and properties. This is illustrated in the process of SSM in figure 8.2. For a definition of the formal systems model, refer back to chapter 5.

The resultant picture (i.e. the conceptual model), represents a model of a system, which can survive on its own, via processes of communication and control, while adapting to a changing environment. However this operational system model must also have a monitoring and control system model attached to it, which can determine the level of performance of the

system in terms of effectiveness (is the system doing the right thing?), efficacy (is the system capable of doing what it is intended to do?) and efficiency (is the transformation process using resources in the best possible manner?).

Effectiveness of a system, however, can only be determined if we consider the 'wider system' of which the system is a part. Checkland (1989) says that by including the 'system owner' in the root definition, it is ensured that system thinking is not restricted to one level. He provides the following example, expressing the idea of a sub-system within a system within a wider system, etc.: "Conceptualising a system to provide health care for the elderly might lead to modelling the wider system which provides health care services". (Checkland, 1989, p285).

At this point, it is worth noting at this point that these ideas fall within the description of Stafford Beer's Viable Systems Model (VSM). The VSM has as its underlying metaphor the neurocybernetic or viable system view, which was also chosen as the metaphor supportive to the dominant metaphor, i.e. cultural. Hence, the VSM will be reviewed in the next chapter (Chapter 9).

8.6.6 STAGE 5: COMPARISON BETWEEN CONCEPTUAL MODELS AND REALITY

It is at this stage where the first principle of SSM is achieved: learning! We return to the real world, where each conceptual model should be compared with reality. This is achieved by looking at the differences between the idealised models and current perceptions of the problem situation, i.e. comparing the conceptual models to the perceived problems being experienced in the situation being studied.

The aim of this comparison is to create new perceptions and to identify changes that can be made to improve the problem situation. In simple terms, deficiencies must be sought: structure, activities or procedures that are absent or inappropriate should be implemented or modified. On the other hand, unnecessary or unfair activities that are currently being performed, or procedures that are implemented, must be identified and either discontinued or modified.

Checkland (1989) infers that an initial comparison is useful at the level of the root definition itself, but suggests four different ways of performing this comparison:

1. List the obvious differences between the models and perceived reality and discuss and debate their importance. This is the simplest method and is useful where roles and/or strategies are an issue.

2. In a more detailed and orderly fashion, list the differences, by studying each conceptual model and define specific questions regarding the activities of the system, as well as their interaction or dependency upon each other. Then answer the questions in the situation itself. If this is not easily achieved, perform further 'finding out' and 'expressing' (i.e. stage 1 and 2 activities of SSM). Checkland (1989, p287) offers some examples of questions: "Does this happen in the real situation? How? By what criteria is it judged? Is it a subject of concern in the situation?" This is Checkland's most recommended method.

3. Draw up scenarios of how situations might occur in the future, regarding each root definition, which can then be compared to descriptions of historical events by the people involved in the problem situation.

4. Build models of parts of reality relevant to particular conceptual models in a similar fashion to how the conceptual models were built. Differences are then recognised.

However, Checkland (1989) maintains that this method is the most formal and often cannot be practically used.

8.6.7 STAGE 6: PROPOSAL OF IMPROVEMENTS OR CHANGES

Using one of the methods of stage 5, inevitably leads to debate about possible improvements or changes that can be made in the problem situation. At this stage, proposed changes or improvements should be systemically desirable and culturally feasible. In fact, Checkland and Scholes (1990, p52) claim that if these phrases are "understood, SSM is understood".

The conceptual models of activity systems built in stage 4 should be relevant to the situation and should include activities which are purposeful. Changes resulting from comparison with reality are "systemically desirable if these 'relevant systems' are in fact perceived to be truly relevant". (Checkland and Scholes, 1990, p52).

Checkland (1981) explains that changes can be made in one or more of the following:

1. Structure
2. Procedures
3. Attitudes

Changes in structure are relatively static and long term and can be performed in the following, for example:

1. Organisational groupings
2. Reporting structures
3. Areas of functional responsibility

Changes in procedure are more dynamic and can be performed in the following, for example:

1. Reporting processes

2. Information processes
3. Any activity performed in the structures described above.

Changes in attitudes can also include changes in influence or expectations. Effective changes in attitudes are much more difficult to achieve than in structures or procedures, (which are easily definable) because in reality the anticipated result is rarely achieved. (Checkland, 1981).

However, changing structures or procedures will inevitably cause changes in attitudes, because these changes occur within a certain culture, which may change that culture. In addition, changes should only be made if they are perceived as being **meaningful** within that culture and its worldview, thereby being defined as culturally feasible changes. (Checkland and Scholes, 1991).

In Flood and Jacksons' (1991) view, attitudinal changes of the participants help in paving the way for making structural and procedural changes. Furthermore, working closely with clients using a methodology like SSM, inevitably changes the culture of an organisation.

8.6.8 STAGE 7: TAKING ACTION (IMPLEMENTATION)

The SSM cycle or process is 'complete' when the identified changes are fully implemented. However, the process can never be complete, in the true sense of the word, as the implemented changes alter the initial perception of the problem situation, which if cycled through the process again, would in all likelihood, yield different results. The implementation is a sort of 'solution' to the 'problem' which cannot be permanent, due to the dynamic nature of the real world. Nevertheless, at this stage the new 'problem situation' should be more structured than it was when the process first began.

It is also worth noting here that SSM itself, may be used to develop the system to implement the proposed changes.

8.7 CRITIQUE OF SSM

Chapter 12 includes a more detailed critique of SSM, as a result of its use at Rhomberg Bräsler. However, at this stage a brief critique of the theory of SSM, based on the findings of Flood and Jackson (1991), is provided:

SSM concludes that the only way of changing social systems is by changing the Weltanschauungen (world views) of the people within those social systems. However, according to Flood and Jackson (1991, p187), "it is extremely difficult to change people's world views without first doing something about the political and economic structures which condition those world views".

'Problems' arise when the perceptions of reality of people within the same situation, differ. However, if this were so, 'problems' could always be solved by bringing perceptions back into congruence, so that any action taken is the result of the unanimous decisions of all those involved. Flood and Jackson (1991, p187) argue that this is a very limited view of the reasons for problem situations. "It ignores, for example, the cybernetic insight that organisations can fail to function properly because communication and control systems are poorly designed. The idea of cybernetic "laws", which must be obeyed when all complex systems are being organised", is not taken seriously by Checkland's soft system thinking.

In light of this criticism of SSM, it is necessary to review the literature of Stafford Beer's Viable System Model (VSM) and its corresponding Viable System Diagnosis (VSD). Both the VSM and VSD claim to take cybernetic criteria and processes of communication and control, into account, when striving for organisational viability. The literature on VSM and VSD is reviewed in chapter 9.

CHAPTER 9

LITERATURE REVIEW: THE VIABLE SYSTEMS MODEL (VSM) AND VIABLE SYSTEMS DIAGNOSIS (VSD)

9.1 VIABLE SYSTEMS MODEL (VSM)

9.1.1 INTRODUCTION

The VSM is an essentially an interaction of subsystems, and models the web of regulatory mechanisms which an organisation requires to cope with the complexity of real-world tasks. It is a conceptual model of the organisation's management information system and is a tool with which to assess the implications of alternative policies. (Espejo and Harnden, eds. 1989).

The aim of the VSM is to explain what makes systems viable, i.e. how they are capable of independent existence.

"A viable organisation must always be able to

- Make all normal decisions simply and effectively (inner stability).

- Adapt itself to changes in the demands made by the world around it. This world consists mainly of customers, employees, suppliers, competitors and owners.
- Learn from experience.

Channels of communication should exist which allow the outside world to influence the organisation. An organisation cannot remain viable if it lacks the means to change and adapt. It becomes out-of-date, and eventually vanishes." (Espejo and Harnden, eds. 1989, p282-283).

9.1.2 THE FIVE SYSTEMS OF THE VSM

An organisation can be perceived as being constructed of different systems or management functions, which make up the structure of a viable system:

1.	Implementation/Operations	(System 1)
2.	Co-ordination	(System 2)
3.	Control	(System 3)
4.	Intelligence	(System 4)
5.	Policy	(System 5)

See Appendix III for diagrams of the Viable Systems Model which can be applied to any organisation. These diagrams include systems 1 to 5.

System 1 (Implementation/Operations) describes what the system is doing, eg. manufacturing, or providing a service, and comprises different parts, which are autonomous in their own right, and are themselves viable systems. Each part is connected to its local environment and absorbs much of the overall environmental variety. In addition, each part or system of Implementation has its own localised management.

Systems 2 to 5 comprise the channels for controlling the separate systems that make up System 1.

System 2 (Co-ordination) comprises the information systems, rules, routines or behaviour needed to decentralise decision making within System 1 (i.e. to enable the units of System 1 to solve their own problems) and thus co-ordinates the parts/systems of System 1. Another function of Co-ordination is to resolve issues or conflicts that develop between the systems that make up System 1. This is realised through formal reporting and by people building their own network of contacts. System 2 can also be described as support and service for the System 1 systems.

Examples of activities in Co-ordination are:

- Work procedures
- Production scheduling
- Quality control of raw materials
- Budgets

System 3 (Control) maintains internal stability and interprets policy decisions in order to implement them, using all available information. Control allocates resources to implementation. Control should attempt to minimise issuing commands and directives to Implementation and should, as far as possible, attempt to develop co-ordination by mutual adjustment, rather than by direct supervision. The control function needs to develop a capacity to monitor Implementation to maintain communication. A manager is working within System 3 when s/he makes a decision about marketing, production, finance or personnel. The personnel representing the control system have the right to acquire information from any source within the organisation.

System 4 (Intelligence) recognises opportunities and constraints within the external environment. It represents a learning function in the organisation and initiates changes and

development work. System 4 should be a dynamic function that determines potential risks and potential opportunities and comprises all work related to change within the organisation. There can be separate systems 4 operating at different levels in the organisation, but they need to exchange information freely.

Examples of Intelligence activities include:

- Assessing the competition
- Market and product analysis
- Technical development (product and process development)
- Development of leadership and management systems.

System 4 identifies the company's needs and required changes and informs System 3 in order for System 3 to take the necessary actions for implementation. Therefore, the two systems require close communication.

System 5 (Policy) is responsible for establishing the organisation's identity. System 5 doesn't get involved in generating know-how or alternative courses of action, but assists in maintaining a balance between current activities (Control) and future needs (Intelligence). Future needs are usually in terms of investments. The board of directors of an organisation always form the part of Policy.

Each of the functions described above are not jobs to be filled. Each one represents the total effort of all jobs which deal with that function. That is, the different systems do not necessarily describe official positions or persons. Control, for example, will comprise the work activities that deal with finances, personnel, management information and quality. Policy will involve people from many work activities, including people with special expertise who may not reside in the organisation.

To illustrate this, consider the following scenario: The wave solder machine on the production line is not soldering properly one morning. The supervisor in charge of the line, utilising the machine that morning, orders the machine to be stopped. S/he is working within System 3 (Control). S/he then informs the supervisor of another line of the breakdown and is thus operating within System 2 (Co-ordination). Later that day, the supervisor proposes to amend the maintenance schedule of the machine to prevent further breakdowns from occurring. This action is categorised under System 4 (Intelligence). Thus, it is evident that many employees operate within more than one system. In addition, the viable system organisation allows for participation. Channels for resource bargaining exist between implementation and control.

As Flood (1993) describes, the VSM is the organisation of these five management functions as a viable system-in-focus. Each viable system-in-focus is part of a less focused viable system. This is so because the Implementation part (System 1) of every viable system is always itself a viable system. This is known as recursive organisational structure, or just recursion, a special form of hierarchy, which promotes autonomy. To illustrate, System 1 could be made up of sections of a production department, or it could made up of subsidiaries in a group of companies. Vertical loading is encouraged which means loading responsibility down to the lowest level at which it can be managed. Hence, organisation through recursion replaces the traditional hierarchical tree. (Espejo and Harnden, eds. 1989).

The VSM focuses on organisation rather than on structure. Thus the VSM can be used to diagnose problems of organisation.

"Organisations ideally are ordered so as to achieve efficient and effective realisation of set goals, although the goals themselves have to be continually reconsidered in response to a rapidly changing environment through self-questioning, learning and by assessing future scenarios." (Flood and Jackson, 1991, p89).

The architecture of the VSM "enhances self-organisation and localised management of problems". (Flood and Jackson, 1991, p90). Emphasis is placed on the influence of the viable system on its environment, and vice versa, in order to promote learning.

Traditionally, the only way of representing the structure of an organisation, was by way of an organisational chart, such as displaying the hierarchy in a functional organisation (Appendix II illustrates the organisational chart of Rhomberg Bräsler). This representation is valid, but when it is the only representation, it implies that the lower one is positioned within the organisation, the less value that person has to the organisation. It also expresses that managers think they can manage effectively just by giving orders. This can unfortunately result in an inflexible organisation where initiative dwindles and everybody waits for instructions from the top. (Espejo and Harnden, 1989).

9.1.3 MEASURES OF ACHIEVEMENT

In addition to the traditional success factors of an organisation (i.e. maximising profits and minimising costs), Flood and Jackson (1991) introduce three measures of achievement:

Actuality - what is actually being achieved at present with the existing resources, within the existing constraints.

Capability - the maximum that could possibly be achieved with the existing resources, within the existing constraints.

Potentiality - what could be achieved by developing the resources and removing, or minimising the constraints. Attempts to achieve the potentiality of a system should always consider wider systems.

This results in three indices of performance, which, amongst other things, indicate how well the organisation is faring in preparing for the future, the organisation's quality achievements and the level of employee morale:

Productivity = actuality / capability

Latency = capability / potentiality

Performance = productivity x latency = actuality / potentiality

The objective in any organisation is to increase actuality, thereby increasing productivity and also performance. In addition, the lower the latency, the more room there is for improvement.

According to Flood and Jackson (1991, p93), these indices "can be used as comprehensive measures of performance in relation to all types of resource throughout the organisation."

9.1.4 COMPARISON OF MEASURES OF ACHIEVEMENT WITH PERFORMANCE MEASURES OF SSM

Flood and Jackson (1991) express that attempts to achieve the potentiality of a system should always consider wider systems. Referring back to SSM in chapter 8, it was said that by determining the effectiveness of a system (i.e. is the system doing the right thing?), the wider system, of which the system is a part, must be considered. In addition, Ackoff (1995) states that effectiveness (i.e. doing the right thing right) is imperative for organisational performance.

The conceptual model of stage 4 of SSM, as described in section 8.6.5 of chapter 8, must survive on its own, via processes of communication and control, while adapting to a changing environment. This means that this notional system must be cybernetically viable.

In addition, it must have a monitoring and control model attached to it, which can determine the level of performance in terms of effectiveness, efficacy and efficiency. Efficiency (or productivity), is necessary in organisations, especially where individual jobs are concerned. However, the importance of effectiveness (or performance) is stressed, because a system can be very ineffective, while still being efficient (or productive). According to Ackoff (1995), this is a case of doing the wrong thing right.

Hence, regarding the performance indices of the VSM, productivity is similar to the measure of efficiency of the conceptual model of the SSM process. Likewise, good performance relates to achieving effectiveness (The comparison described in this section, is discussed again in chapter 11).

9.2 VIABLE SYSTEM DIAGNOSIS (VSD)

9.2.1 INTRODUCTION

The purpose of the VSM is to test the design of a system and if necessary, to redesign it. This design is assessed by performing is a Viable System Diagnosis (VSD), which according to Flood and Jackson (1991), consists of two stages:

1. System identification
2. System diagnosis

If we were to perform a VSD of Rhomberg Bräsler, we would essentially be testing the design of the company as a system and if required, redesigning certain structures and processes.

9.2.2 SYSTEM IDENTIFICATION

The ideals to be pursued must be identified and a VSM must be drawn up to represent the system in terms of the 5 functions of management.

9.2.3 SYSTEM DIAGNOSIS

Diagnosis involves asking questions in search of causes of error and identifying poor communication and control, particularly relating to internal and external customers. Each management function of the system-in-focus must, in turn, be studied. Flood and Jackson (1991) suggest the following guidelines for each, and Flood (1993) has adapted them in terms of quality (illustrating how it would be used in a certain context - in this case in terms of quality):

For each part of Implementation:

1. Detail the following:
   - A) Customers / Environment
   - B) Operations
   - C) Localised management
2. What constraints are imposed by higher management?
3. How is accountability exercised (for example, in terms of quality)?
4. What indicators of performance are taken?

Co-ordination:

1. List possible sources of oscillation, poor customer service, or conflict between the various parts of Implementation and their customers (or environments). Also identify the parts of the system that have a harmonising effect.
2. How is the image and quality of Co-ordination perceived in the organisation? Is it threatening or facilitating?

Control:

1. List the Control components of the system-in-focus.
2. How does Control exercise authority (for example, how does it control quality)?
3. How is resource bargaining with the parts of Implementation carried out?
4. Who is responsible for the performance (such as the quality) of the parts of Implementation?
5. Does Control conduct any audit enquiries into the quality or any other aspect of implementation.
6. Understand the relationship between Control and Implementation. How much freedom does Implementation have?

Intelligence:

1. List all the Intelligence activities of the system-in-focus.
2. How much of the future do these activities consider?
3. Do these activities guarantee adaptation in the future?
4. Does Intelligence monitor what is happening in the external environment (i.e. external customers) and assess trends?
5. Is Intelligence open to novelty?
6. Does Intelligence provide an environment for decision-making by consolidating internal and external information?
7. Can Intelligence alert Policy in the case of urgent developments

Policy:

1. Who participates in Policy (i.e. who is on the Board) and how does it act?
2. Does Policy provide a suitable identity and quality mission for the system-in-focus?
3. How does the ethos set by Policy affect the perception of Intelligence?
4. How does the ethos set by Policy affect how Control and Intelligence interact?
5. Does Policy share an identity with Implementation?

Are all information channels, transducers and control loops in place and are they properly designed?

The outcome of the VSD should indicate violations of cybernetic principles and expose organisational faults. If required, suggestions for re-design or re-organisation can then be offered.

9.3 DISCUSSION ON THE USE OF VSM AND VSD

Espejo and Harnden, eds. (1989) tell us how, in a company called the ASSI group, the VSM is taken as a standard reference to guide co-operation and co-ordination and is a regular part of their management training at all levels, in order to teach people to delegate and distribute information effectively. It was introduced to develop organisational competence and to increase the conscious flow of information. Three words are always stressed by management: **quality**, **training**, and **information**. Studying the cybernetics of a company's organisation will uncover weaknesses in the company's ability to formulate effective policies. It is also necessary to give all activities the internal capacity, so that they can respond to the demands of a complex environment, i.e. structuring each activity as a unit with discretion and autonomy. This results in senior managers becoming less and less involved in trivial operational problems. (Espejo and Harnden, eds. 1989).

Each employee in an organisation should be aware of the objectives of the organisation and what is expected of him/her as an employee of that organisation. Management should spend time motivating employees to improve and to perform well in their jobs.

According to Espejo and Harnden, eds. (1989) every organisation should establish rules and procedures to maintain internal stability, and should have the ability to adapt or change, since it is dependent on the changing world around it. Every employee should have access to all the information necessary to maximise his/her job performance and all decisions should be made at as low a level in the organisation, at which adequate information is available (i.e. decentralisation).

Espejo and Harnden, eds. (1989) believe that there are different, yet equally valid, viable system models of the same organisation. The analyst can be trapped in one viewpoint and as a result, is unable to see these other descriptions of the organisation. Hence, any organisational study must have 'multisystemic variety', that is, it must be the result of the negotiations of multiple viewpoints. In addition, it is inadequate to just map the formal structure of the organisation, such as laid out in an organisational hierarchy chart, on to the VSM. One should use more subtle criteria in establishing recursion levels. One can hypothesise one's perceptions of how the organisation functions, or can base the analysis on the managers' perceptions of how the organisation functions. By comparing the views of individual managers with effective structure, as provided by the VSM, possible improvements can be recognised. The outcome of a VSD may lead to structural adjustments, aimed at improving control and communication processes throughout the organisation.

"The Viable System Model offers a paradigm for problem solving. Its understanding offers a mental tool to approach the creation and design of effective contexts for the participation of people in human activities." (Espejo and Harnden, eds. 1989, p98).

9.4 CRITIQUE OF THE VSM AND VSD

Flood and Jackson (1991) define how the VSM emphasises organisational structure and communication and control channels and processes, but can be seen to neglect the human side, culture or social processes of an organisation. However, these factors are important to consider in complex modern world organisations, since it is the people that make up the structure and processes of an organisation. Using the VSM can result in the purposeful roles of individuals being neglected. Flood and Jackson (1991, p110) also suggest that the tendency of the viable systems model is to "take some predetermined goal as given. It then seeks to pursue this goal as efficiently and effectively". It is therefore only useful in unitary contexts where the decision to pursue a particular goal, is unanimous. Furthermore, Flood and Jackson (1991, p111) say that "descriptions of the VSM make no explicit mention of negotiation forums or participation to take account of individual viewpoints. But neither does the model reject participation." Participation of all employees and the eliciting of different perceptions for the solving of the perceived problems at Rhomberg Bräsler is important, due to the pluralistic context in which the problems prevail.

All the criticisms of the VSM are aimed at using the model in isolation. However, Flood and Jackson (1991) combine methodologies in their 'Total Systems Intervention', such as combining neurocybernetic with cultural and political concerns in an organisation.

"The VSM offers a conceptual model of the organisation's management information system". (Espejo and Harnden, eds. 1989, p362). As was mentioned in chapter 8, the conceptual models that need to be formulated as part of the Soft Systems Methodology process, are based upon the structure of a viable systems model.

9.5 SYNTHESIS

"The Viable System Model offers a paradigm for problem solving. Its understanding offers a mental tool to approach the creation and design of effective contexts for the participation of people in human activities." (Espejo and Harnden, eds. 1989, p98). It is this paradigm which can help in the process of SSM (i.e. the dominant methodology for this thesis), since the emphasis of the SSM is on participation.

The outcome of Viable Systems Diagnosis (VSD) should indicate violations of cybernetic principles and expose organisational faults. A VSD of Rhomberg Bräsler would test the design of the company as a system and, if required, redesign certain structures and processes. This is what SSM sets out to do, but the VSM helps in maintaining cybernetic criteria in the organisation. Hence, Rhomberg Bräsler needs to remain viable in terms of its structures and processes.

Referring back to chapter 7, Flood and Jackson (1991, p230) have said that the VSM backs up SSM "in dealing with complexity because of its uniquely explicit understanding of brain related issues (learning, forward thinking, etc.)." According to Flood (1993), viable systems thinking aids meaningful measurement and allows for participation, autonomy and motivation.

One of the criticisms of SSM in chapter 8, is that SSM can fail because organisations may fail to function properly because communication and control systems are poorly designed. Thus, an understanding of the VSM and VSD should prevent neglecting these systems while using SSM.

The VSM is essentially a conceptual model. Therefore, understanding the VSM can be very beneficial to understanding the conceptual model formulation in the process of SSM.

The scope of the intervention into Rhomberg Bräsler has been limited to the use of Soft Systems Methodology. VSM and VSD were not actually employed in the research phase of this thesis, but an understanding of them should provide a better understanding of the situation, in terms of organisational viability, autonomy, communication and participation. Therefore, a clear understanding of the VSM and of VSD should make the use of SSM and the understanding of its use, all the more rich.

We now move onto the use of SSM, dealing with the issues prevailing at Rhomberg Bräsler. But first, it is necessary to review the field of Ethnography, since the process of SSM can be viewed as being a subset of ethnography, as is explained in the next chapter.

CHAPTER 10

LITERATURE REVIEW: ETHNOGRAPHY & ETHNOGRAPHIC RESEARCH

10.1 INTRODUCTION

Spradley (1979, p5) simply defines ethnography as the study or description of culture, referring to "the acquired knowledge that people use to interpret experience and generate social behaviour". Ethnography is thus a tool for understanding ourselves and the multi-cultural societies that exist in the real world.

The objective of using ethnography is to try and see the world from another's point of view. "Rather than *studying people*, ethnography means *learning from people*". (Spradley, 1979, p3).

Referring to the section 'The Process of Soft Systems Methodology' in Chapter 8, stage 1 of the methodology is a process of 'finding out' about the situation in which a problem is perceived. This stage of 'finding out' includes the gathering of information through observation or through informal interviews with the participants within the perceived problem situation.

Gill and Johnson (1991, p93) tell us that "ethnographers usually place more emphasis on observation and semi-structured interviewing than on documentary and survey data".

As interview data is the major source of material used in the research process of this thesis, one can regard Soft Systems Methodology as a 'subset' of, or at least related to, the field of Ethnography.

Hence, in order to understand the nature of interviewing techniques or the validity of the outcome of interview based research, we need to establish a better understanding of ethnography.

Ethnographic research is an inductive process of inquiry, as described for SSM in Chapter 8.

Gill and Johnson (1991, p93) believe that "in ethnography the focus is on the manner in which people interact and collaborate in observable and regular ways". In a study of shop floor relations, Gill and Johnson (1991) recommended that the researcher observes activity on the production line, i.e. participant observation, supplemented by semi-structured interviewing.

Gill and Johnson (1991, p108), however, are reluctant to define ethnography as a single mode of acquiring information, since one may need to apply a combination of techniques, depending on "the purposes of the research, the setting in which the research is to take place, the resources available to the researcher and the nature of the study".

What follows is an account of the different types of observation within ethnography and which is applicable to this thesis. In addition, an introduction to an ethnographic interview and a guide to making inferences is described. Finally, the validity of using ethnography as a research technique is discussed.

10.2 PARTICIPANT AND NON-PARTICIPANT OBSERVATION

Participant observation involves the researcher participating in the activities of the people being studied (i.e. the subjects), sharing their day to day experiences. This enables the researcher to 'get to the bottom' of certain issues, as a result of the trust that tends to build up between the researcher and the subjects. Without this direct source of information, the researcher has to rely on others to communicate the information to him/her, which can lead to mis-interpretation. However, this type of research can cause the researcher to 'internalise' the culture of the subjects s/he is studying, thus interpreting the information from the culture base of the subjects.

On the other hand, the non-participant observer or 'spectator' has little or no interaction with the subjects. This can lead to problems of ethnocentricity where "the observer fails to gain access to and to understand the cultural underpinnings of subjects' overt behaviours and actions. Indeed, the observer may inadvertently analyse and evaluate those events and processes from the perspectives and rationality of his/her own culture". (Gill and Johnson, 1991, p110). However, as a spectator, the researcher may be less likely to affect the situation which s/he is studying, or upset the behaviour in that setting.

10.3 OVERT AND COVERT OBSERVATION

As described in the previous section, the researcher, as observer, can be either a participant or a spectator. The nature of the research as either type of researcher, can be either overt (subjects are aware of the researcher's presence and of being studied), or covert (subjects are unaware of the researcher's presence and of being studied).

Thus the following four types of researcher types are possible:

1. Complete participant (participant conducting covert research)
2. Complete observer (spectator conducting covert research)
3. Observer as participant (spectator conducting overt research)
4. Participant as observer (participant conducting overt research)

Gill and Johnson (1991) say that most researcher roles fall into either group 3 or 4 (i.e. observer as participant or participant as observer), while part-time management students are likely to research as 'participant as observer' when working in their organisations and will take various positions within the broad 'participant as observer' role.

Of the four researcher roles described above, the participant as observer role, as in the case of this thesis, relies on interviewing people on events and issues that the researcher has been unable to observe directly.

A great deal of the information that is necessary for conducting the SSM process on the problem situation being perceived at Rhomberg Bräsler, is interview based, classified as 'indirect observation' which is explained in the next section. However, as a result of my day to day involvement at Rhomberg Bräsler, including my involvement on the production line, there is a degree to which I performed direct observation as well. The degree to which this type of observation was overt or covert depended on how suspicious people on the production line were of my daily interaction with the line, as it was public knowledge that I was performing a 'university project' within the organisation.

10.4 DIRECT AND INDIRECT OBSERVATION

Direct observation is research conducted where the information obtained is first hand, such as the complete observer, who relies on secondary data, such as company documents, to supplement primary data collected by him/herself.

Indirect observation, is research conducted by obtaining information which is reported to the researcher orally, such as in interviews, or in writing.

With any type of interviewing, there is the problem of incorrectly interpreting statements made by interviewees. However, the interview allows the researcher access to information that s/he would otherwise be unable to obtain.

10.5 INTRODUCTION TO THE ETHNOGRAPHIC INTERVIEW

According to Spradley (1979), an ethnographic interview and a friendly conversation appear, from the informant's point of view, not to be very different. Skilled ethnographers have the ability to gather their data from casual conversations, sometimes without the awareness of their informant. "It is best to think of ethnographic interviews as a series of friendly conversations into which the researcher slowly introduces new elements to assist informants to respond as informants". (Spradley, 1979, p58). However, the ethnographer's approach to entering an interview session, should not be to prepare a set of questions which s/he wants answered, but should rather be to guide, to a certain extent, certain issues to be discussed, which are relevant to the subject being studied.

10.6 MAKING INFERENCES

Ethnography involves direct or indirect observation of behaviour, attempting to understand the meaning of that behaviour. However, the culture of people being studied cannot be directly observed. The observer needs to make his/her own cultural inferences. More simply, the ethnographer must go "beyond what is seen and heard to infer what people know. It involves reasoning from evidence (what we perceive) or from premises (what we assume)". (Spradley, 1979, p8).

Spradley (1979) identifies three sources from which cultural inferences can be made:

1. What people say.
2. The way in which people act.
3. The artefacts that people use.

However, it must be stressed that these sources only lend themselves to making inferences, i.e. a cultural description, which may be adequate.

Spradley (1979, p9) states that he focuses "exclusively on making inferences from what people say". As interview data is the main source of information for the research of this thesis, Spradley's interpretation of ethnographic research serves as a good background to the subject and to the manner in which interviews should be conducted, especially in urging people to talk about what they know.

It must also be acknowledged that the results of ethnographic research depend on the language used to describe the results, which can be the language of the researcher or of the informants. It must also be realised that the interpretations by different people of the same event, will almost certainly be different. That is, each culture provides people with a particular way of seeing the world - different worldviews, or Weltanschauungs (as in stage 3 of the SSM process).

10.7 STRENGTHS AND WEAKNESSES OF RESEARCH METHODOLOGIES

Different research methodologies have inherent strengths and weaknesses which must be taken cognisance of when conducting research.

Gill and Johnson (1991) discuss four criteria for evaluating the findings of research data:

1. **Internal validity** - determines the extent to which the cause (or stimulus) produces the effect (or response).
2. **External validity** - determines the extent to which the findings of the research can be generalised beyond the research sample or setting, and can be subdivided into:
   - 2.1 *Population validity* - the extent to which it is possible to generalise from the sample of the research subjects, to a wider population.
   - 2.2 *Ecological validity* - the extent to which it is possible to generalise from the actual social context in which the research took place, to other contexts or settings.
3. **Reliability** - how consistent the research results are. That is, if another researcher could replicate the research with the same subjects in the same setting, then the research findings are reliable.

10.8 EVALUATION OF ETHNOGRAPHIC RESEARCH

Before commencing this type of research, it is important to understand and take note of the strengths and weaknesses of ethnographic research and thus, its validity and reliability.

Gill and Johnson (1991) elicit the following criticism of ethnography:

- Ethnographic research, being inductive and unstructured, is not very replicable or reliable.
- Since the methodology is usually only applied to a few cases, it has low population validity.
- Cause and effect relationships are often difficult to determine, thus leading to low internal validity.

However, the advantage of ethnography over other research methods, is that it has greater ecological validity, because it involves studying social phenomenon in their natural contexts (i.e. their everyday settings). Gill and Johnson (1991, p125) claim that ethnographic researchers are "more likely than deductive researchers to become aware of important factors that did not form part of his/her preconceived notion of the situation".

In addition, Gill and Johnson (1991, p111) express that it is important for the researcher to remain reflexive, meaning that "rather than to attempt to eliminate the effects of the researcher on the phenomenon under investigation, the researcher should attempt to understand his/her effect upon, and role in, the research setting and utilise this knowledge to elicit data".

10.9 SYNTHESIS

As was hypothesised in chapter 2, a small company that grows rapidly from a small operation into a corporate structure, will experience problems (or growing pains), unless organisational change is managed systemically, in terms of structure, processes and attitudes. Rhomberg Bräsler has grown into a small corporate structure and is experiencing problems. Therefore, it was deduced that organisational change at Rhomberg Bräsler needs to be managed systemically.

Chapter 11 deals with the inductive phase of this thesis (as explained in chapter 2) of applying Peter Checkland's Soft Systems Methodology (Checkland, 1981) at Rhomberg Bräsler. The outcome of this phase, presented later in this thesis, is a set of rules, or proposals and recommendations, in terms of structure, processes and attitudes.

As stage 1 and 2 of SSM is a process of 'finding out' and expressing the problem situation in terms of relevant human activity systems, it was necessary to obtain data via research, which took the form of interviews with various participants of the problem situation (i.e. indirect observation) as well as direct observation. I also attempted to apply the ethnographic interview technique to obtaining information covertly from certain employees at Rhomberg Bräsler. All the stages of the process of SSM applied at Rhomberg Bräsler, are outlined in the following chapter.

CHAPTER 11

USE OF SOFT SYSTEMS METHODOLOGY AT RHOMBERG BRÄSLER
(i.e. Use and Results of Research Methodology)

11.1 INTRODUCTION

As an introduction to this section, I refer you back to Chapter 1: 'Problem Definition'. In short, it is my perception and the perception of others, that Rhomberg Bräsler has been experiencing problems in its recent expansion phase, the nature of which cannot be easily defined. Thus, one cannot just say that Rhomberg Bräsler has been experiencing 'problems' - it is only a perception. Hence, this perception is referred to as the 'problem situation'.

The choice of problem solving methodology for use in the problem situation at Rhomberg Bräsler, is Soft Systems Methodology. This choice was made, as a result of the use of Flood and Jacksons' 'Total Systems Intervention' approach for selecting an appropriate systems methodology (refer back to Chapter 6).

The results of using SSM at Rhomberg Bräsler is presented in the individual stages of the process of SSM. The reader is urged to constantly refer back to 'The Process of Soft Systems Methodology' in Chapter 8, where a detailed explanation of the process is provided.

11.2 SSM: STAGE 1

Stage 1 of the SSM process, as described earlier, is the process of finding out about the situation in which a problem is perceived and includes the gathering of information through observation and/or through informal interviews with the participants of the perceived problem situation.

Various interviews with participants in the problem situation at Rhomberg Bräsler have been conducted and a wide range of diverse opinions and views of different issues have emerged.

The scope of the research for this thesis has been limited to the production system at Rhomberg Bräsler, including all the people, processes and structures involved with, or linked to the production system. However, this does not mean that the rest of the organisation and the environment has been disregarded. It is rather a case of 'thinking globally, but acting locally'. In other words, a holistic view was taken in viewing the problem situation and the organisation. Due to time constraints, the research has only been performed in the production system. The scope would be too wide if the whole organisation was involved in the process. Patching (1990, p264) writes that "it may be necessary to merge some real-world facts with systems thinking", by setting the system boundary, after considering the relationships between the participants of the situation, as well as of the rest of the organisation. In other words, I have set the system boundary to include only production line activities. Patching (1990, p254) also expresses that "this might appear contrary to the idea of keeping systems thinking and real world aspects separate, but it can provide a compromise that ensures that progress can be made; however, such compromises should be recognised as such and not made as a matter of course."

Various people directly involved with the production line, including production operators and supervisors, as well as technicians from New Product Development, who interface with the production line, endured lengthy interviews. In addition, the production

manager and the quality manager were interviewed, in order to obtain perceptions on the problem situation at Rhomberg Bräsler, from a management perspective.

Strümpfer's "Systems Approach Questions for Problematical Situations' (see appendix III), were used in order to prompt discussion during the start of the interview sessions with each interviewee. These questions are divided into three sections:

Group A: Future directed.
Group B: Present directed.
Group C: Problem Situation directed.

According to Strümpfer, his questions have proved useful in practice, and are intended for guiding an inquiry as part of a larger systems approach methodology, in this case, Soft Systems Methodology, by eliciting different perceptions from different perspectives.

The general interview process, suggested by Strümpfer, is as follows:

1. As an introduction, the interviewee is informed of the purpose of the interview. However, only the vaguest possible outline of the situation of interest should be presented.
2. The first three 'Future directed' questions are asked. These questions are intended to 'start the ball rolling', where the interviewee starts to present his/her perception on the nature, essence or character of the problem, the history of the problem and the events that lead to the perception of the problem. Strümpfer (p1) says that the questions in group C "serve to gain insight into current systemic relationships".
3. The 'Future directed' questions of Group A are then presented to the interviewee in order to elicit the interviewee's view of what the ideal system should be and how it should operate.

However, the above 'procedure' served only as a guideline for the interviews that I conducted at Rhomberg Bräsler. These steps were not always followed verbatim, nor were any of the other questions in Appendix IV asked in any specific sequence. As

Spradley (1979) says, the approach to entering an interview session should not be to prepare a set of questions which the interviewer wants answered, but should rather be to guide, to a certain extent, certain issues to be discussed, which are relevant to the problem situation being studied.

Wherever possible, each interview followed its own course, without a structure being imposed on it. I began each interview with promises of anonymity and confidentiality, so as to establish a trust, allowing the interviewee to 'open up' without fear of the information being disclosed to others. In order to make the interviewee feel more comfortable, I explained that I was a novice and that I was in need of his/her views on the problem situation in order to assist my project. Some interviews were recorded on cassette and analysed at a later stage, while detailed notes were taken in others.

As explained in Chapter 10, my researcher role as defined by Gill and Johnson (1991), was 'participant as observer', since I was interviewing people on events and issues that I was unable to directly observe. This is regarded as overt observation.

In addition to obtaining interview data, I regularly, over a period of several months, covertly observed activity on the production line. This is recommended by Gill and Johnson (1991) as a useful supplement to semi-structured interviewing. As I stated in Chapter 10, the degree to which this type of observation was overt or covert depended on how suspicious people on the production line were of my daily interaction with the line, as it was public knowledge that I was performing a 'university project' within the organisation.

During the research phase of this thesis, the production facility at Rhomberg Bräsler became extremely busy, since product demand from distributors and customers has exceeded production capacity, necessitating a great deal of overtime work to be performed on the production line. This resulted in it becoming extremely difficult to obtain interview time from 'production people'. For this reason, to supplement the interview data from the interviews and from my own observations, I covertly 'interviewed' various other staff members during the normal activities of day-to-day

production. Spradley (1979) says that if the researcher is skilled enough, s/he can gather data from casual conversations without the 'interviewee' even realising it.

The people selected as interviewees, whether consulted overtly during interview sessions or covertly using ethnographic interview techniques, were all considered to be problem owners, defined by Checkland (1981, p294), (assuming 'he' refers to 'he' or 'she'), as:

> "He who has a feeling of unease about a situation, either a sense of mismatch between 'what is' and 'what might be' or a vague feeling that things could be better and who wishes something were done about it. The problem owner may not be able to define what he would regard as a 'solution', and may not be able to articulate the feeling of unease in any precise way."

The next step was to work towards a problem situation expressed to define relevant human activity systems.

11.3 SSM: STAGE 2

With the gathering of information, "knowledge is acquired and impressions start to form. Being a soft situation" at Rhomberg Bräsler, the situation "will never become structured within the defined meaning of the word, but it is nonetheless possible to find out more about the inherent relationships that are there". (Patching, 1990, p54).

Patching (1990) also recommends that points made by interviewees should be summarised into 'problem' categories and an attempt should be made to determine the possible root causes of these 'problems'. Thus, once all the interview and observation data had been typed up, it was rearranged in order to classify the information into categories. This information is shown in detail in Appendix V. The following is a short list (in no specific order) of 'labels' given to all the issues (Note that each issue contains points of view from different people's perspectives):

• Union membership	• Production management	• Technicians - salaries
• House meetings	• Decision making	• Product design changes - monitoring of cost
• Culture change	• Flexi-time	• Performance incentive scheme
• Organisational change	• Suggestion system	• Management
• Human resources development	• Discipline, Tidiness of the workplace	• Management trust
• Empowerment	• Production operators - relationship with management	• Management-staff relationship
• Company's aims and money spending	• Supervisory management	• Production system - improvements
• Operators setting their own targets - for example, at the printing area	• Communication	• Kanban / WCM
	• Morale	• Affirmative action
	• Quality	• Promotion
• Job satisfaction	• Training on the production line	• Problems - general
• "Blue skies" quality circles	• Employee involvement	• Quality Management
		• The future

The essence of stage 2 is to express the problem situation in terms of relevant and purposeful human activity systems. In order to do this, it is necessary to build up a rich picture of the situation, to enable the selection of different viewpoints from which to develop the system models, i.e. to identify human activity systems that are relevant to the situation.

Expressing the problem situation in a rich picture was performed through Checkland's (1981) three analyses, as follows, and then in terms of a rich picture, illustrated in figure 11.1:

ANALYSIS 1 - SYSTEMS ANALYSIS OF THE INTERVENTION

1.1	**Client:**	Executive Management of Rhomberg Bräsler, particularly Peter Bräsler (Chairman of Rhomberg Bräsler Manufacturing (RBM)).
1.2	**Client's aspirations:**	To develop Rhomberg Bräsler (RB) into a learning organisation, where all employees are constantly learning and developing by becoming more involved, ensuring their motivation and job satisfaction, ultimately resulting in increased organisational performance, due to increased effectiveness. To learn more about 'systems thinking' approaches in order to solve management problems and for guiding organisational development.
2.1	**Problem solvers:**	Larry Narunsky, RBM management.
2.2	**Resources available:**	SSM. RB staff. UCT GSB and RB libraries, Assoc. Prof. Tom Ryan - UCT, MBA company analyses, 12 months project time.
2.3	**Possible constraints:**	Time available for conducting the research. Available interviewee time. Resistance to change. Failure in gaining support.

3.1	**Possible Problem owners:**	Client: The Chairman of RB - Peter Bräsler and The Managing Director - Gerald Bidder. Problem solver: Larry Narunsky The Production Manager - Wolfgang Marnitz. The Quality Manager - Willie Matthee. The Mechanical Engineering Manager - Rob Businger. The Production Supervisors - Judy Baron, Yvonne Jacobs, Betty Scholtz. The Production operators of RB Manufacturing. The Quality Control Technicians The Distributors/Customers of RB. Electronic, and other component suppliers to RB. New Product Development (NPD) employees. Families of employees of RB, The Process Control Industry The Union. Other Electronics companies in the vicinity.
3.2	**Implications of problem owners chosen:**	Peter Bräsler wants to realise his aspirations, as described above, in practical terms. Thus, any recommendations made as a result of a systems study must be implementable. He has also expressed, in the past, that once it is mutually decided to venture down a new path in management philosophy, there is no turning back. Thus, at all stages, it will be necessary to obtain maximum participation and involvement from all staff and management, especially where recommendations for change are made. Thus, recommendations for change must be culturally feasible. Management, other staff, supervisors and operators must all feel included in any organisational development project. It might be difficult to assess the effect or implications of change on families of RB staff, as well as on the process control industry and other electronics companies.
4	**Problem content**	See problem definition in Chapter 1, as well as the Interview and Observation Data in Appendix V.

ANALYSIS 2 - SOCIAL SYSTEM ANALYSIS

Roles in Rhomberg Bräsler

Roles include maintaining relationships with other role holders at Rhomberg Bräsler. The basic role of a Rhomberg Bräsler employee is to contribute to the production of process control products and to the delivery of these products, as well as services, to the process control industry.

According to Checkland and Scholes (1990, p49), "by 'role' is meant a social position recognised as significant by people in the problem situation", such as the chairman or managing director of the company, the production manager or a production supervisor. Roles are characterised by norms. The actual performance in a role is judged according to values.

Chairman and Managing Director of RBM possible roles:

- Predicting trends from the market place.
- Receiver and gatherer of information.
- Planner of Rhomberg Bräsler.
- Needs definer for Rhomberg Bräsler.
- Liaisor, co-ordinator and manager of resources.
- Chairman and member of various company committees.

Production Manager possible roles:

- Analysing trends in production methods.
- Presenter/experimenter with new production methods.
- Planner of production.
- Purchaser/liaiser of components
- Labour relations consultant.
- Personnel management.

Supervisor possible roles:

- Leader
- Facilitator
- Scheduler
- Trainer

Norms (i.e. expected behaviour)
Peter Bräsler is very entrepreneurial and proactive in his approach to company management. He is an instigator of change and organisational development and believes that he will be supported by certain of his management team, as well as certain staff members. He explains possible company plans for long term change, but is not properly understood. His intentions are often misinterpreted. He takes a keen interest in people's work. However, this is not consistent. The production manager needs to be a good motivator and supporter on the production line. He needs to instil self-discipline and delegate responsibility. Supervisors constantly train operators, organise workload, schedule - might receive more commitment and respect by delegating decision making.
Values (i.e. what constitutes good behaviour or bad behaviour in each role).
A commitment to the development of the company into a 'world player' in the industrial automation markets. A clear sense of purpose. Values according to the "Rhomberg Bräsler Statement of Company Principles and Objectives" - see appendix VI.

ANALYSIS 3 - POLITICAL SYSTEM ANALYSIS

Disposition of power
• Chairman has ultimate power and final decision in all matters. • Management power is mostly concentrated in the middle management roles, i.e. with managers such as the New Product Development, Quality or Production managers. • In some cases, departmental management is achieved by team consensus, such as in various teams in New Product Development.
Nature of Power
• Ability to influence others within the organisation and externally. • Ability to persuade others and to enlist their support. • Formal role-based authority • Intellectual authority • Personal charisma • External reputation
Process by which power is obtained and exercised.
Power is obtained by virtue of one's: • position in the hierarchy in the company. • specialised technical expertise. • confident, influential and/or charismatic personality.
Power is exercised by: • taking control of meetings by force of strong personality, e.g.. Peter Bräsler. • giving technical or expert advice to others in the organisation, e.g.. NPD manager.. • having the managerial skills that others do not necessarily have. • using knowledge, as a result of having access to privileged information.

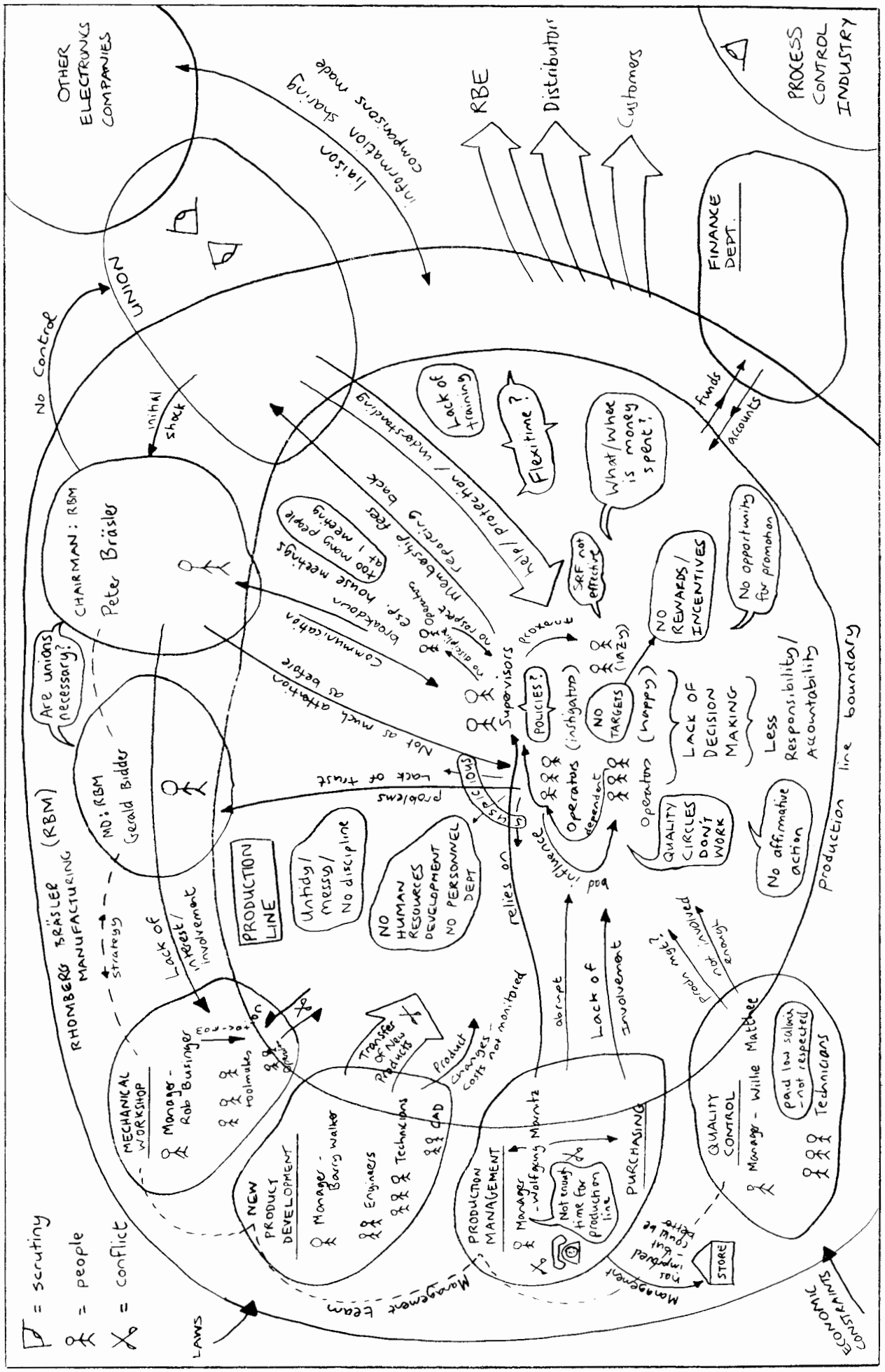


Figure 11.1 Rich Picture of the Perceived Problem Situation at Rhomberg Bräsler

From the rich picture, I have realised that there are mismatches between structure and processes at Rhomberg Bräsler. The lack of active production management, on the part of either the managing director of RBM, the production manager, or the quality manager, is evident. There seems to be a degree of confusion in responsibilities regarding production line planning, management and development. For a company striving to claim the status of World Class Manufacturer, the production line should be the focus of attention for development, but some structural arrangements are not clearly defined. Managers spend a great deal of time 'putting out fires', i.e. dealing with short-term operational problems and issues, hence neglecting their managerial duties. There is thus a lack of policy decision making and a lack of monitoring employee performance. There seems to be, to a certain degree, an overlap of job responsibilities. No performance appraisal system is implemented, hence no incentive scheme exists. In addition, there is no continuous training programme that allows employees to develop. Training is performed on an ad hoc basis. Conflict exists between various participants. Communication is not as efficient as it can be. Production operators don't trust management and are suspicious of management.

Having examined the 'climate' of the problem situation, I have selected the production system as an important system for study. Furthermore, as a result of examining the rich picture, the following possible relevant systems have been chosen.

- A system to supply electronic goods to the process control industry.
- A system for satisfying income needs.
- A system to manage the implementation of company policies or guidelines.
- A system to provide employment to potential employees.
- A system to enhance the company's image (i.e. an image-building system), thereby creating more business.
- A system for monitoring and controlling production activities.
- An accountability system.
- A system to improve communication and information flow, especially between the shop floor and other departments.
- A system for socialising and developing friendships.

- A system for generating profits.
- A system for exploiting employees.
- A system to enhance the chairman's personal image.
- A system for providing support and assistance.
- A system to train production staff.
- A system to reduce destructive internal conflict and job overlap.
- A system for training young inexperienced graduate engineers and technicians.
- A system for providing work experience.
- A system for providing information on industry wage levels.
- A system for creating personal wealth.

Root definitions of the first fifteen relevant systems are presented in the next section.

11.4 SSM: STAGE 3

In this section I have constructed root definitions for the human activity systems presented above, which are relevant and I have checked them against the CATWOE mnemonic. As Checkland and Scholes (1990, p31) say, "no human activity system is *intrinsically* relevant to any problem situation, the choice is always subjective."

1. A SYSTEM TO SUPPLY ELECTRONIC GOODS TO THE PROCESS CONTROL INDUSTRY.

C - Distributors and Customers of Rhomberg Bräsler

A - Management, Staff, Distributors, Customers and New Product Development Employees

T - Distributors' and Customers' process control needs being identified and satisfied

W - The production line is a place to produce electronic process control equipment for sale in order to satisfy the process control industry

O - Company Shareholders

E - Product demand in the process control industry.

Hence **Root definition 1** is:

'A system owned by the company's shareholders, and operated by staff, management, distributors and customers, that identifies and satisfies the needs of distributors and customers of the process control industry, in an environment that promotes supplier-customer service and loyalty, constrained by product demand in the process control industry'.

2. A SYSTEM TO SATISFY INCOME NEEDS.

C - Rhomberg Bräsler production staff

A - Management and staff

T - Staff's needs for income are identified and satisfied

W - An electronics manufacturing company is an income source.

O - Management

E - Competition for staff, resources, union's involvement

Hence **Root definition 2** is:

'A system, owned by management, operated by management and staff of the production line, that clarifies and satisfies the income needs of staff in an environment of competition for staff resources, constrained by the involvement of the unions over wage structures, and hours and conditions of work'.

3. A SYSTEM TO MANAGE THE IMPLEMENTATION OF COMPANY POLICIES OR GUIDELINES.

C - Staff

A - Management and Staff

T - The need for policy or guideline formulation satisfied (i.e. the need for policies or guidelines ⟶ policy or guideline formulation)

W - The production line is a working environment in which activities are carried out according to a set of policies or guidelines.

O - Management

E - Time and resources available to management and staff as well as the company statement of principles and objectives (see Appendix VI).

Hence **Root definition 3** is:

'A system owned by management, and operated by management and staff, that identifies and satisfies the needs of staff by formulating policies or guidelines, in an environment that promotes management-staff harmony, within the constraints of the principles and objectives of the organisation, as well as time and resources available.'

4. A SYSTEM TO PROVIDE EMPLOYMENT TO POTENTIAL EMPLOYEES.

C - Rhomberg Bräsler and potential employees

A - Management, staff and potential Rhomberg Bräsler employees

T - Unemployed people or production people working in another company ⟶ people working for Rhomberg Bräsler

W - Rhomberg Bräsler is a good company to work for, i.e. a good working environment to gain experience in electronics manufacture.

O - Management

E - The limited company budget

Hence **Root definition 4** is:

'A system owned by management, and operated by management and staff, that identifies and satisfies the employment needs of unemployed people or production people working in another company, in an environment that promotes employment of production people, constrained by the limited company's budget.'

5. A SYSTEM TO ENHANCE THE COMPANY'S IMAGE (I.E. AN IMAGE-BUILDING SYSTEM), THEREBY CREATING MORE BUSINESS.

C - Shareholders and Customers

A - Management, Staff, Distributors, Quality Assurance, New Product Development and Customers (existing and potential)

T - Existing and potential customers ⟶ satisfied customers

W - The quality, professional and organised image of the production line promotes the sale of superior products.

O - Management

E - Practical constraints in exhibiting the production line to potential customers.

Hence **Root definition 5** is:

'A system owned by the company's management, and operated by management and staff, that endeavours to improve the image of the production facility at Rhomberg Bräsler as well as its services to existing and potential customers, to promote a superior product, thereby creating more business.'

6. A SYSTEM FOR MONITORING AND CONTROLLING PRODUCTION ACTIVITIES.

C - Production staff, Management

A - Management

T - Management with little experience in monitoring and control ⟶ Efficient and effective monitoring and control

W - Management need to know how well their policies are being implemented.

O - Management

E - Time available to and experience of management.

Hence **Root definition 6** is:

'A system owned by management, and operated by management, that identifies the need for monitoring and controlling the complex production activities in which production line staff are involved on a day-to-day basis, to ensure that policy is being implemented effectively and efficiently, constrained by a lack of time available to and experience of management.'

7. AN ACCOUNTABILITY SYSTEM.

C - Management and staff

A - Management and staff

T - Accountability and responsibility being transferred to staff, i.e. unmotivated staff with little or no accountability ⟶ motivated, accountable and responsible staff.

W - More responsible and accountable staff are more motivated and perform better in their jobs.

O - Management

E - Education, experience and willingness of staff.

Hence **Root definition 7** is:

'A system owned and operated by management and staff, that identifies and satisfies the motivational needs of staff by giving them more accountability and responsibility, constrained by the level of the education of the staff as well as their willingness to take on more responsibility and to be more accountable.'

8. A SYSTEM TO IMPROVE COMMUNICATION AND INFORMATION FLOW, ESPECIALLY BETWEEN THE SHOP FLOOR AND OTHER DEPARTMENTS.

C - Management and staff

A - Management

T - Need for improved communication and information flow satisfied.

W - In order to perform one's job well, whether it be a managerial or shop floor production position, good communication and information flow is necessary between the two.

O - Management

E - Time and resources available to management.

Hence **Root definition 8** is:

'A system owned by management, and operated by management and staff, that identifies and satisfies the need for better communication and information flow, under the constraints of resources and time available to managers'.

9. A SYSTEM FOR SOCIALISING AND DEVELOPING FRIENDSHIPS.

C - Production staff

A - Production staff

T - Staff needs for a good social life and friendships satisfied.

W - The production line is a place to socialise and enjoy oneself in its pleasant and friendly atmosphere.

O - Management

E - Differing personalities of the different people.

Hence **Root definition 9** is:

'A system owned by management, and operated by the production staff, that satisfies the need for socialising and developing friendships, constrained by the differing personalities of the people involved.'

10. A SYSTEM FOR GENERATING PROFITS.

C - Shareholders

A - Management and staff

T - Shareholder's needs for generating profits satisfied

W - The production line is the main department for creating the products which the company sells to make a profit.

O - Shareholders

E - The limited needs of the process control market as well as operating expenses.

Hence **Root definition 10** is:

'A system owned by the shareholders, and operated by management and staff, that identifies and satisfies the need for generating profits, under the constraints of the limited needs of the process control market as well as operating expenses.'

11. A SYSTEM FOR EXPLOITING EMPLOYEES.

C - Management (beneficiaries) and staff (victims)

A - Management

T - employees ⟶ exploited employees

W - The production line is a place to employ production people and exploit them.

O - Management

E - Union pressures and staff resistance

Hence **Root definition 11** is:

'A system owned by management, and operated by management, that exploits employees, under the constraints of staff resistance and the union to which the majority of the staff members belong.'

12. A SYSTEM TO ENHANCE THE CHAIRMAN'S PERSONAL IMAGE.

C - The chairman

A - The chairman, management and staff

T - need for enhancing chairman's personal image ⟶ that need met

W - The impressive presentation of the production line and its activities is a way of enhancing the chairman's personal image

O - The chairman

E - Management and staff's criticisms of the Chairman's reasons for doing certain things or making certain decisions, as well as staff's resistance against the Chairman's decisions.

Hence **Root definition 12** is:

'A system owned by the chairman, and operated by the chairman, management and staff, that identifies and satisfies the need for enhancing the chairman's personal image, under the constraints of management and staff pressures.'

13. A SYSTEM FOR PROVIDING SUPPORT AND ASSISTANCE .

(Flood and Jackson, 1991)

C - Management and staff

A - Management and staff

T - Relationship between management and staff unsatisfactory Mutual relationship which is supportive and helpful

W - Management needs knowledge and understanding of staff, and vice versa, so that both parties can perform their functions in the organisation well.

O - Management

E - Time and resources available to management and staff.

Hence **Root definition 13** is:

'A system owned and operated by management and staff, that builds a strong and supportive relationship between management and staff, thereby increasing knowledge, understanding and respect of each other, within the constraints of limited available time and resources.'

14. A SYSTEM TO TRAIN PRODUCTION STAFF

C - Staff, and ultimately Rhomberg Bräsler

A - Management and staff

T - Need for trained and experienced staff satisfied

W - Training can be achieved through good planning of production line activities, hence providing staff with good production experience

O - Management

E - Time and resources for production line activities

Hence **Root definition 14** is:

'A system, owned by the company management, and operated by management and staff, that trains production staff to provide them, and ultimately the organisation, with further experience and skills, within the constraints of the production line carrying out its core activities.'

15. A SYSTEM TO REDUCE DESTRUCTIVE INTERNAL CONFLICT AND JOB OVERLAP.

C - Management and staff

A - Management and staff

T - Need to avoid or reduce destructive internal conflict and job overlap, satisfied

W - Destructive internal conflict, as well as job overlap, leading to further destructive conflict, should be avoided since valuable energy is wasted.

O - Management

E - Existing structures and divisions within Rhomberg Bräsler

Hence **Root definition 15** is:

'A system owned and operated by management and staff, that satisfies the need for avoiding destructive internal conflict as well as job overlaps, leading to further destructive conflict, within the constraints of the existing structures and divisions within Rhomberg Bräsler.'

Thus, the root definition of each purposeful human activity system has described what each system **is**. The formulation of conceptual models in the next section illustrates, for each root definition, what the system **does**.

11.5 SSM: STAGE 4

In this section I have constructed conceptual models of each root definition presented above.

Root definition 1

'A system owned by the company's shareholders, and operated by staff, management, distributors and customers, that identifies and satisfies the needs of distributors and customers of the process control industry, in an environment that promotes supplier-customer service and loyalty, constrained by product demand in the process control industry'.

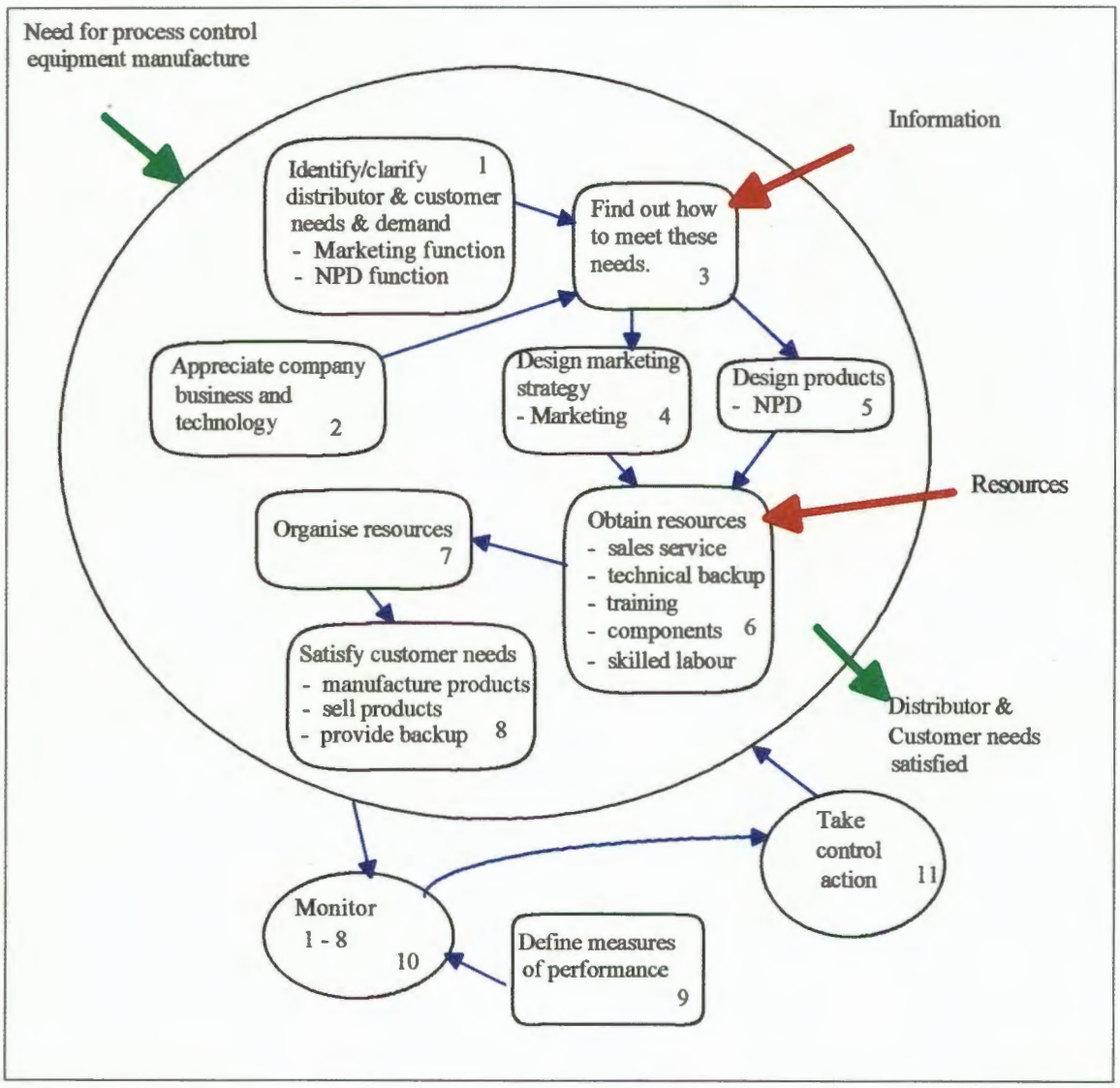


Figure 11.2 Conceptual model of Root definition 1 - A first model

As figure 11.2 illustrates, the minimum number of activities necessary to meet the requirements of root definition 1 are presented in logical sequence. The transformation process of distributor and customer needs being satisfied (i.e. by the manufacture of process control equipment, which s/he can purchase and which is suitable for his/her application), is clearly shown via arrows into and out of the 'system'.

It is important to note at this point that each of the eight activities (or 'verbs') in the conceptual model can be considered as a system in itself and can therefore have its own root definition formulated. In this way, every activity can be expanded into its own conceptual model, thus creating another level of resolution. However, the scope of this thesis limits the conceptual model construction to one level of resolution, i.e. the first level of resolution.

The core activity of the transformation process of root definition 1, is to manufacture goods and sell them, whilst providing after-sales backup. However this is dependent on identifying and clarifying the customers' and distributors' needs whilst appreciating the nature of the company's business and its technology. Figure 11.2 also includes processes of monitoring and control, which are preceded by defining measures of performance. As explained in chapter 8, performance is measured in terms of efficacy, efficiency and effectiveness.

All the activities, according to Checkland (1981), can be grouped together as activities of an 'awareness' system which precede the actual activities achieving the transformation, i.e. the 'operational' system. This, as well as the 'monitoring and control' system is illustrated in figure 11.3. For measures of performance, Checkland and Scholes (1990) place 'effectiveness' at a different level from efficacy and efficiency. Measures of performance in terms of efficacy and efficiency can be related to measures of 'productivity', as defined under the section 'Measures of Achievement' in chapter 9, for the Viable Systems Model. Thus, developing efficiency, or productivity, is endeavouring to achieve the maximum with the existing resources, within the existing constraints. However, effectiveness is measured in terms of 'potentiality', i.e. what could be achieved by developing the resources and minimising the constraints. Thus, ultimate performance is measured in terms of effectiveness.

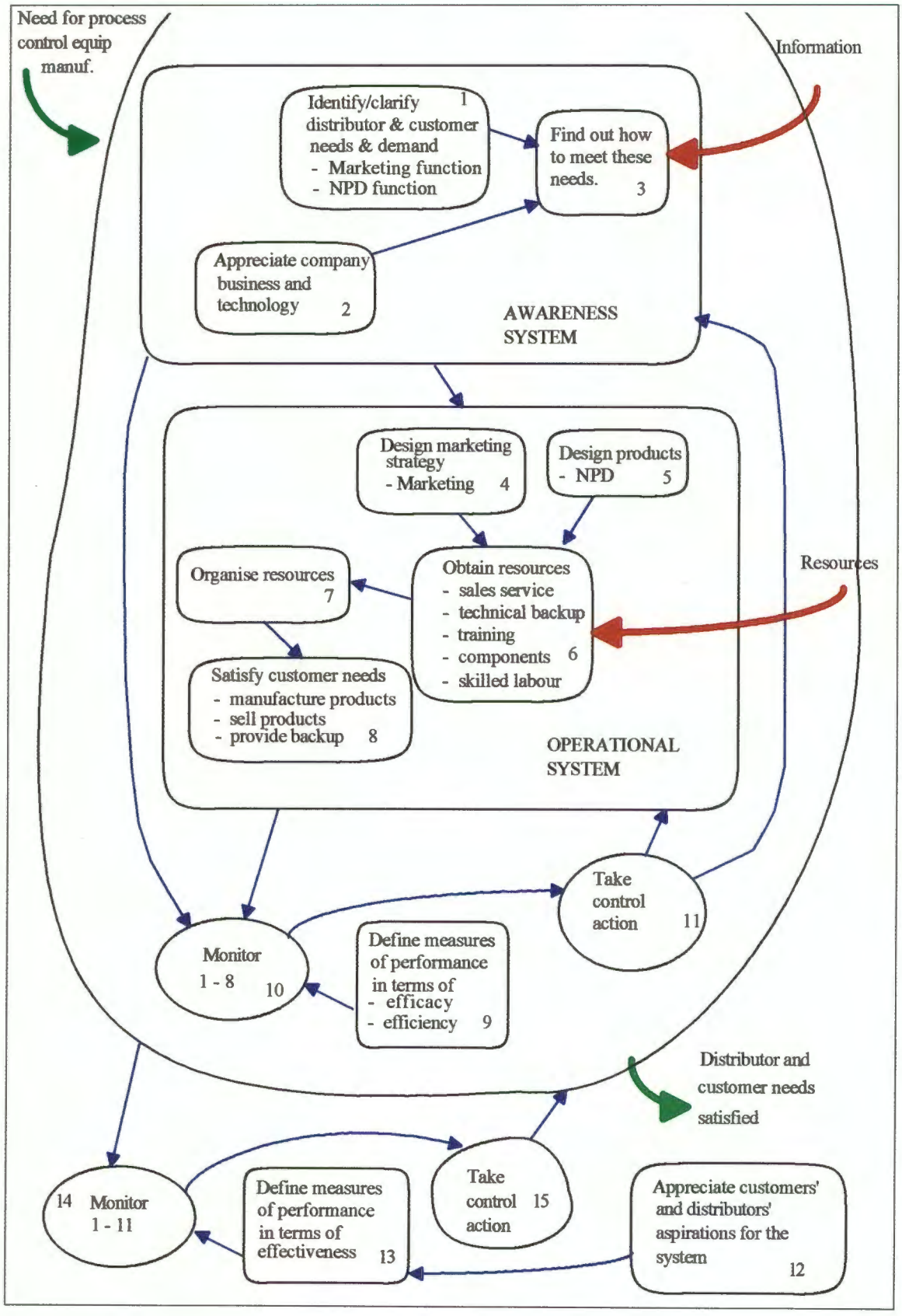


Figure 11.3 Conceptual model of Root definition 1 - Split into Awareness, Operational and Monitoring & Control systems.

Figure 11.4, illustrating the conceptual model of root definition 1 at the first level of resolution, is the general format for any further conceptual models constructed in this thesis.

In any of the conceptual models drawn, the thin arrows denote logical dependency whilst the thick arrows denote flow of information. Furthermore, monitoring and control processes can relate to any one of the activities in addition to the system as a whole.

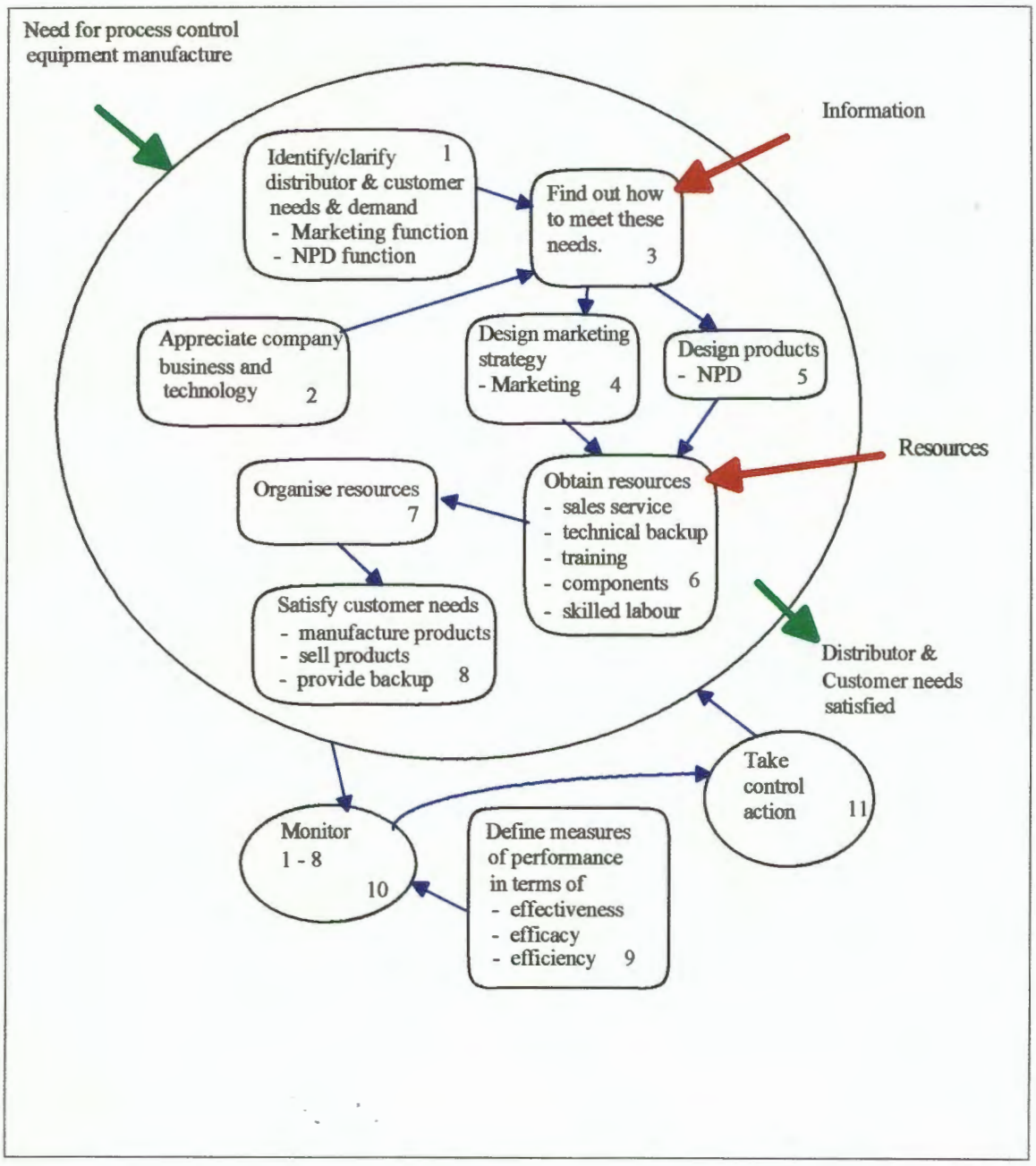


Figure 11.4 Conceptual model of Root definition 1 - format used in this thesis

Root definition 2

'A system, owned by management, operated by management and staff of the production line, that clarifies and satisfies the income needs of staff in an environment of competition for staff resources, constrained by the involvement of the unions over wage structures, and hours and conditions of work'.

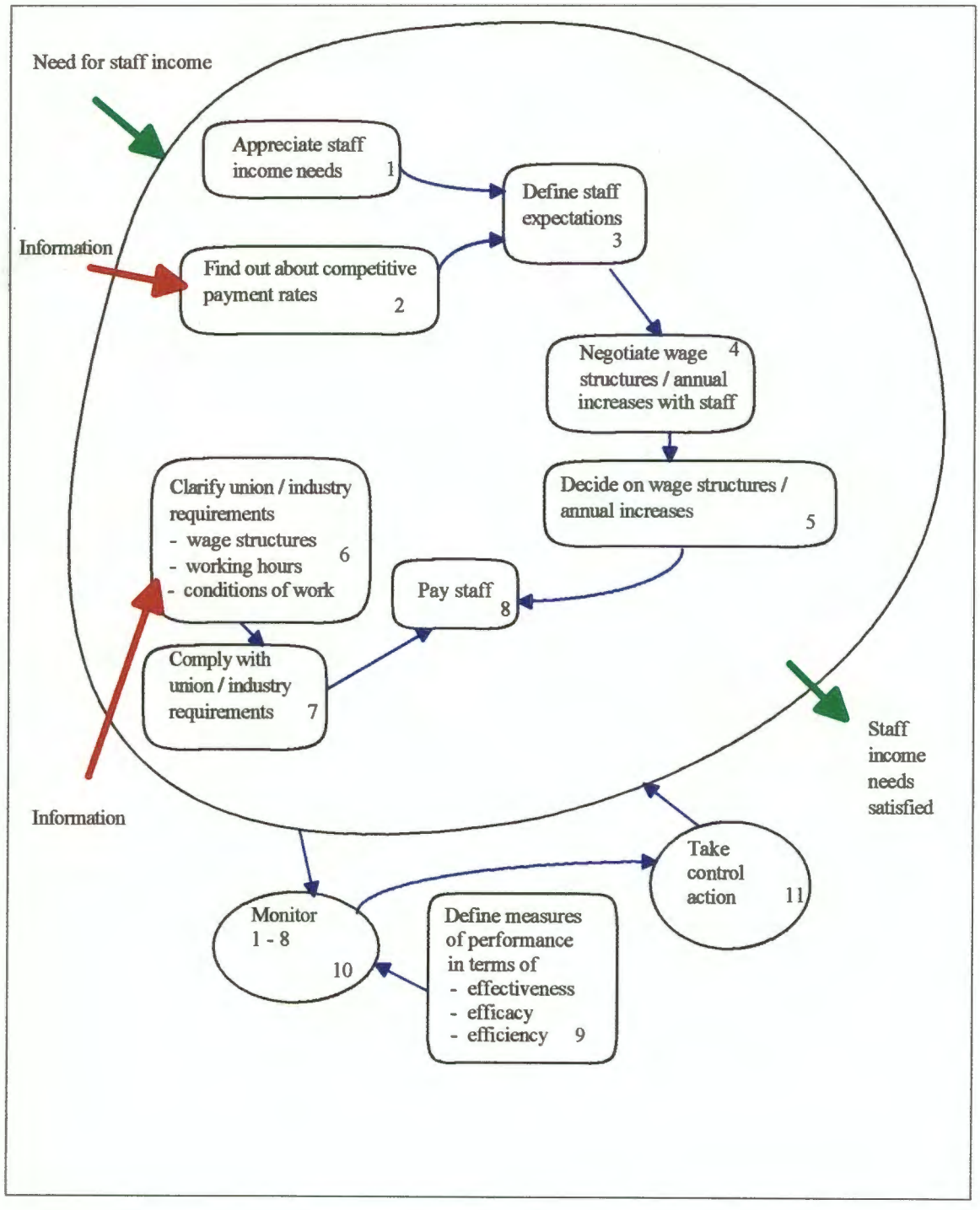


Figure 11.5 Conceptual Model of Root Definition 2

Root definition 3

'A system owned by management, and operated by management and staff, that identifies and satisfies the needs of staff by formulating policies or guidelines, in an environment that promotes management-staff harmony, within the constraints of the principles and objectives of the organisation, as well as time and resources available.'

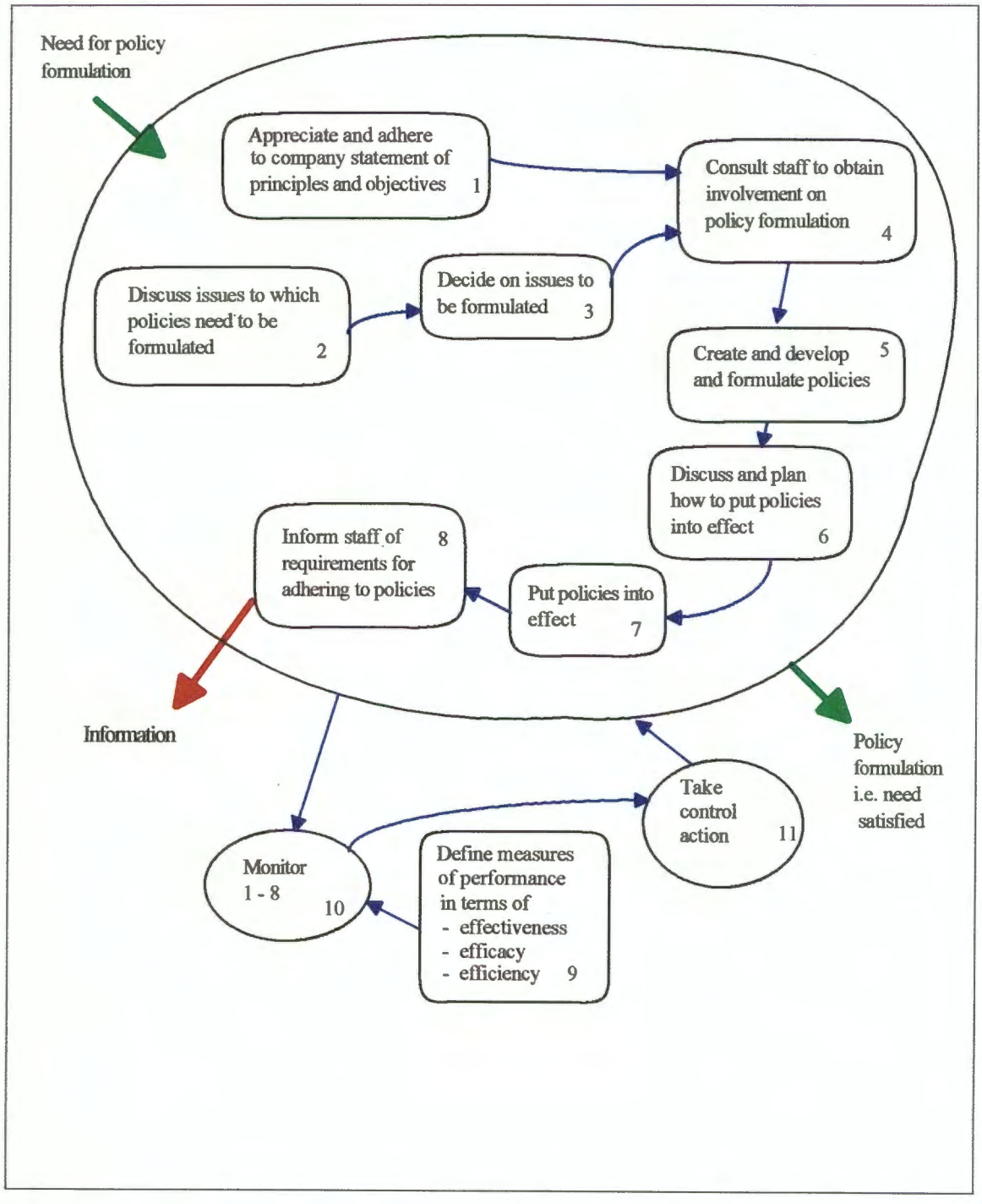


Figure 11.6 Conceptual Model of Root Definition 3

Root definition 4

'A system owned by management, and operated by management and staff, that identifies and satisfies the employment needs of unemployed people or production people working in another company, in an environment that promotes employment of production people, constrained by the limited company's budget.'

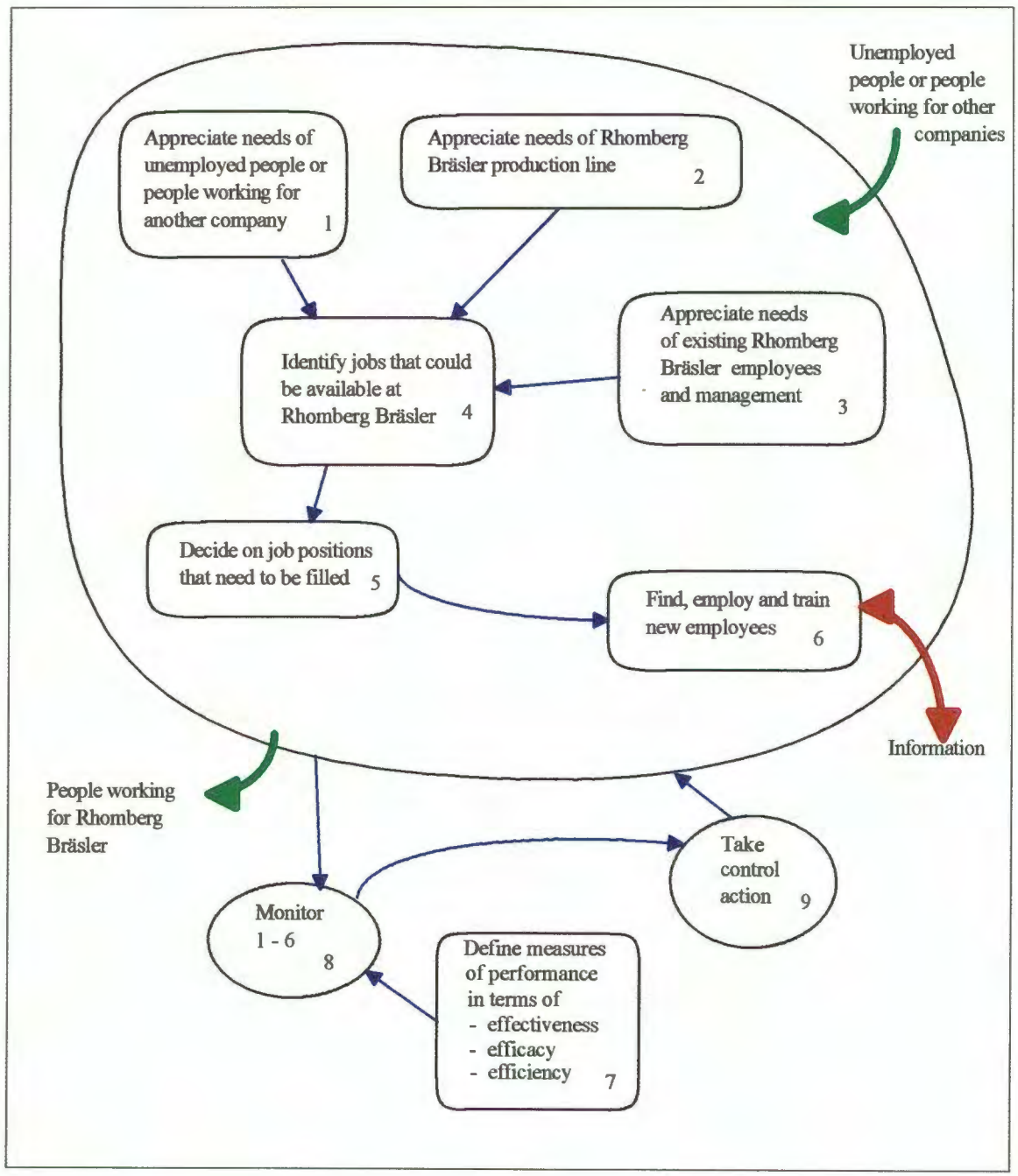


Figure 11.7 Conceptual Model of Root Definition 4

Root definition 5

'A system owned by the company's management, and operated by management and staff, that endeavours to improve the image of the production facility at Rhomberg Bräsler as well as its services to existing and potential customers, to promote a superior product, thereby creating more business.'

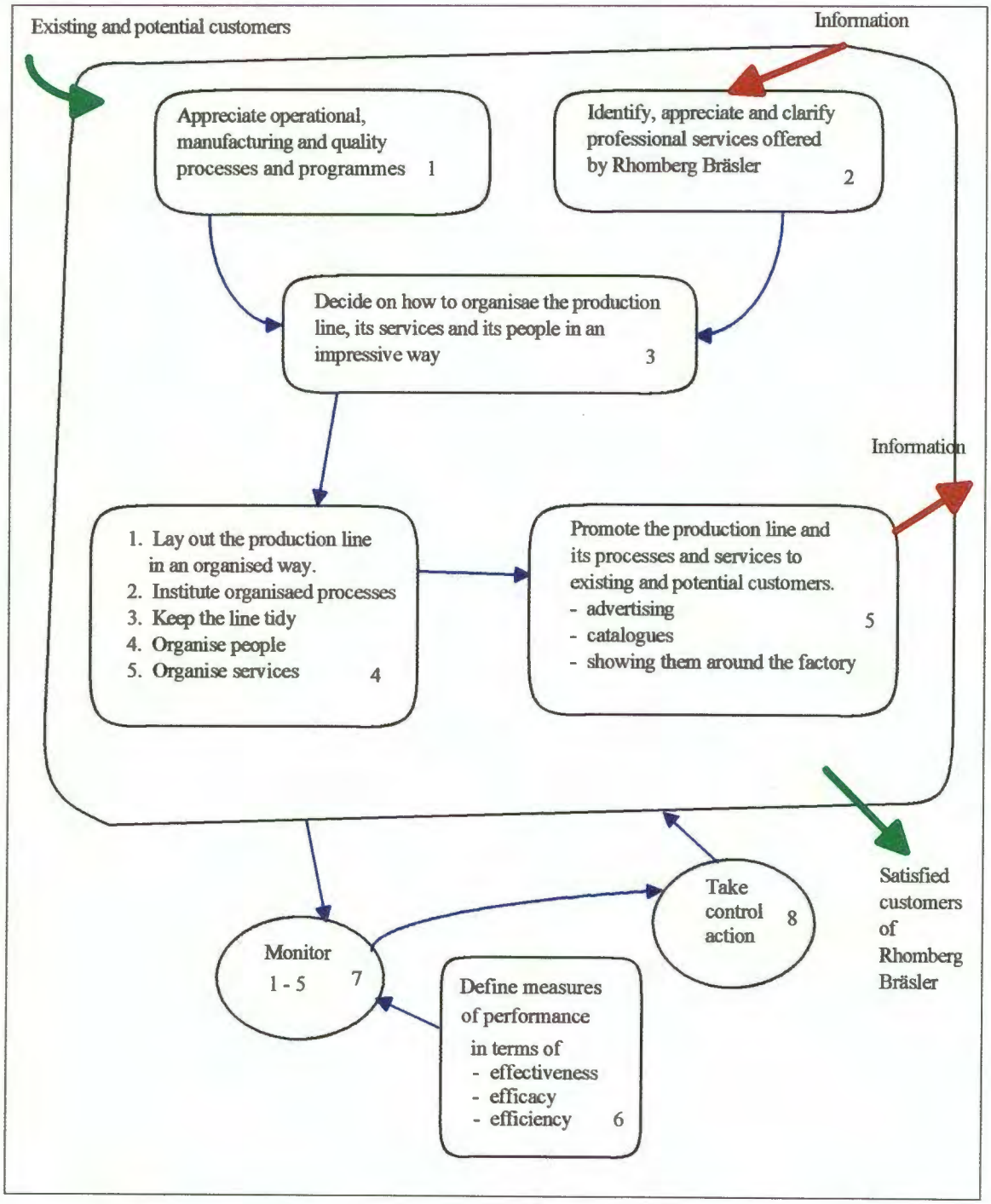


Figure 11.8 Conceptual Model of Root Definition 5

Root definition 6

'A system owned by management, and operated by management, that identifies the need for monitoring and controlling the complex production activities in which production line staff are involved on a day-to-day basis, to ensure that policy is being implemented effectively and efficiently, constrained by a lack of time available to and experience of management.'

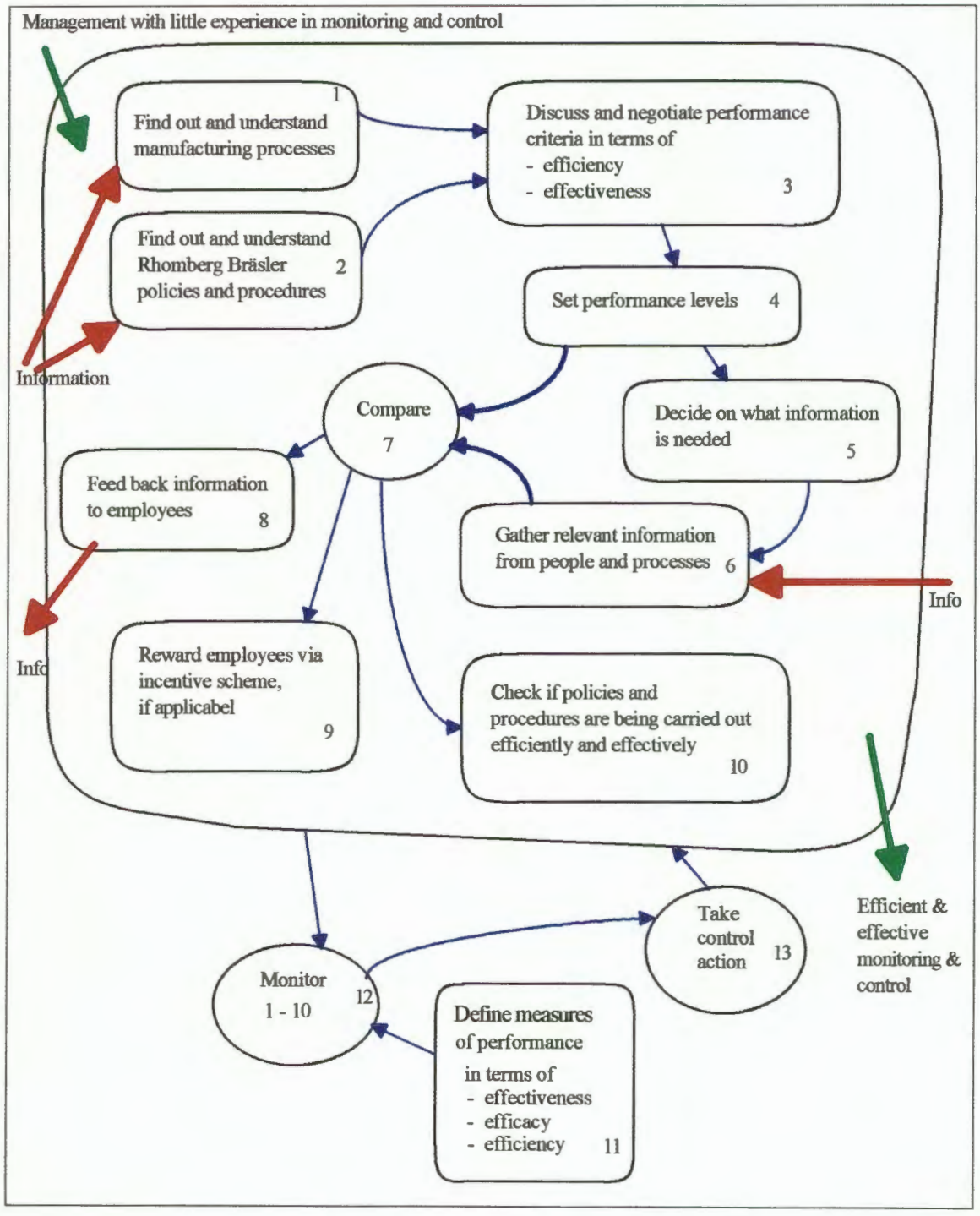


Figure 11.9 Conceptual Model of Root Definition 6

Root definition 7

'A system owned and operated by management and staff, that identifies and satisfies the motivational needs of staff by giving them more accountability and responsibility, constrained by the level of the education of the staff as well as their willingness to take on more responsibility and to be more accountable.'

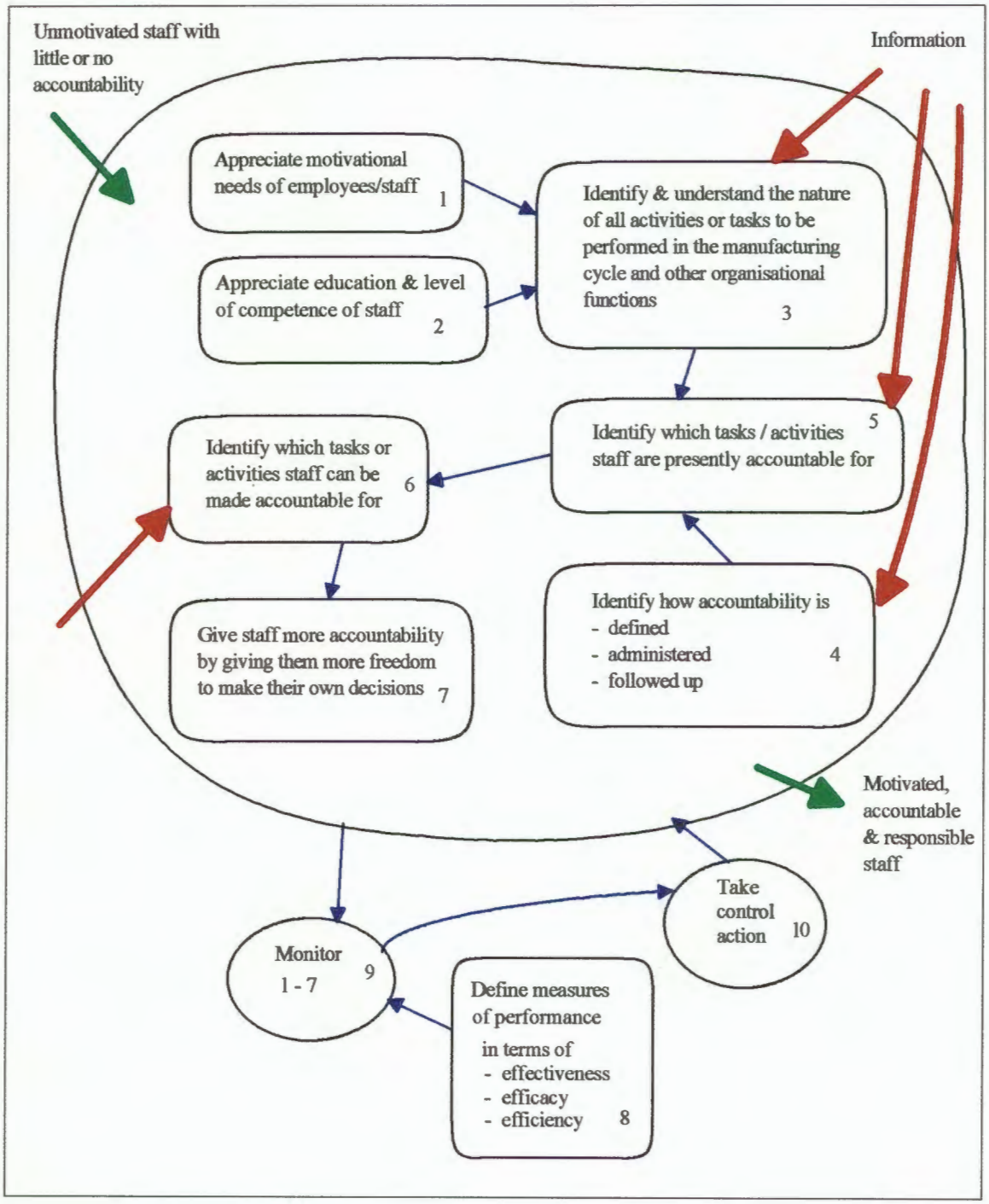


Figure 11.10 Conceptual Model of Root Definition 7

Root definition 8

'A system owned by management, and operated by management and staff, that identifies and satisfies the need for better communication and information flow, under the constraints of resources and time available to managers'.

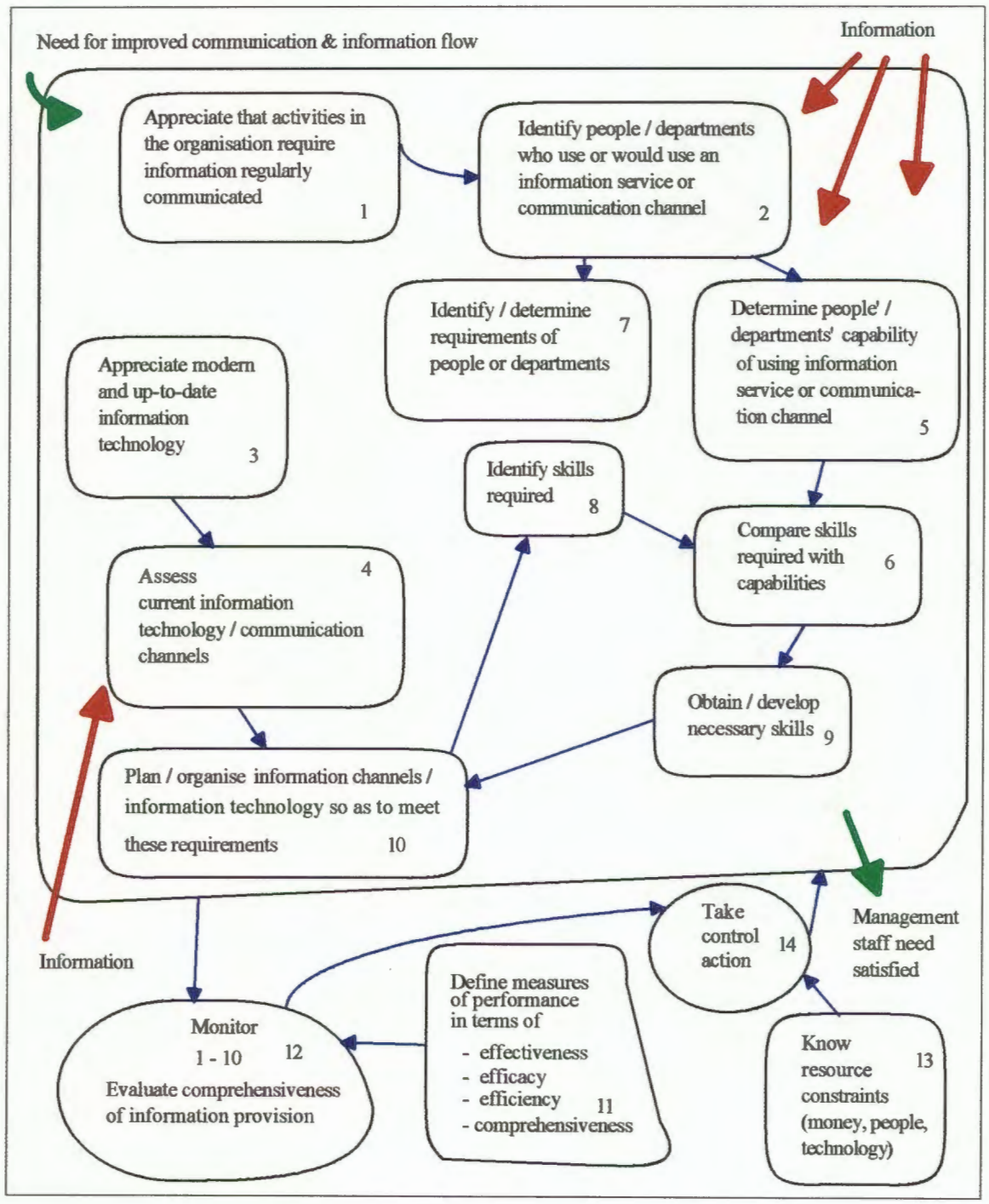


Figure 11.11 Conceptual Model of Root Definition 8

Root definition 9

'A system owned by management, and operated by the production staff, that satisfies the need for socialising and developing friendships, constrained by the differing personalities of the people involved.'

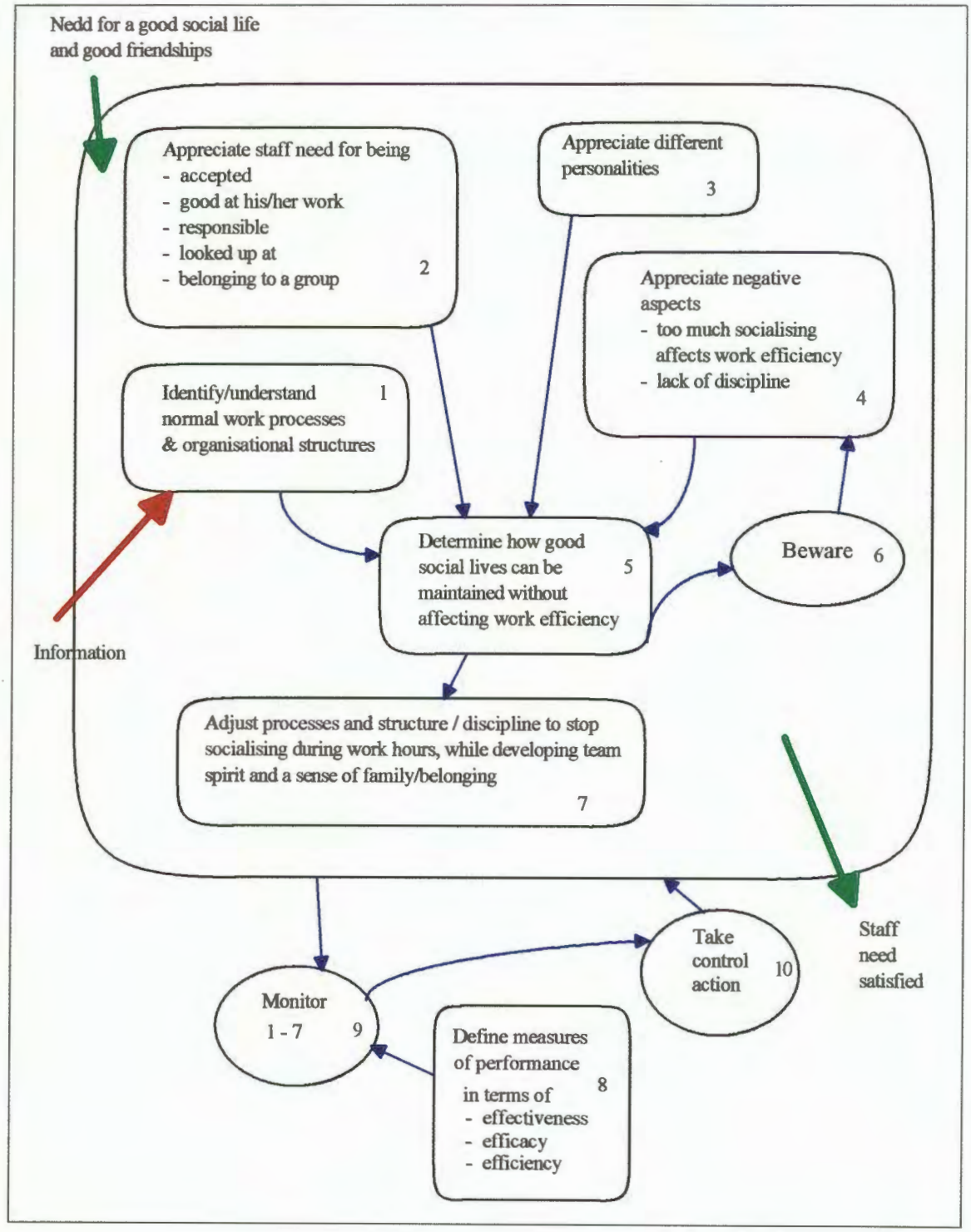


Figure 11.12 Conceptual Model of Root Definition 9

Root definition 10

'A system owned by the shareholders, and operated by management and staff, that identifies and satisfies the need for generating profits, under the constraints of the limited needs of the process control market as well as operating expenses.'

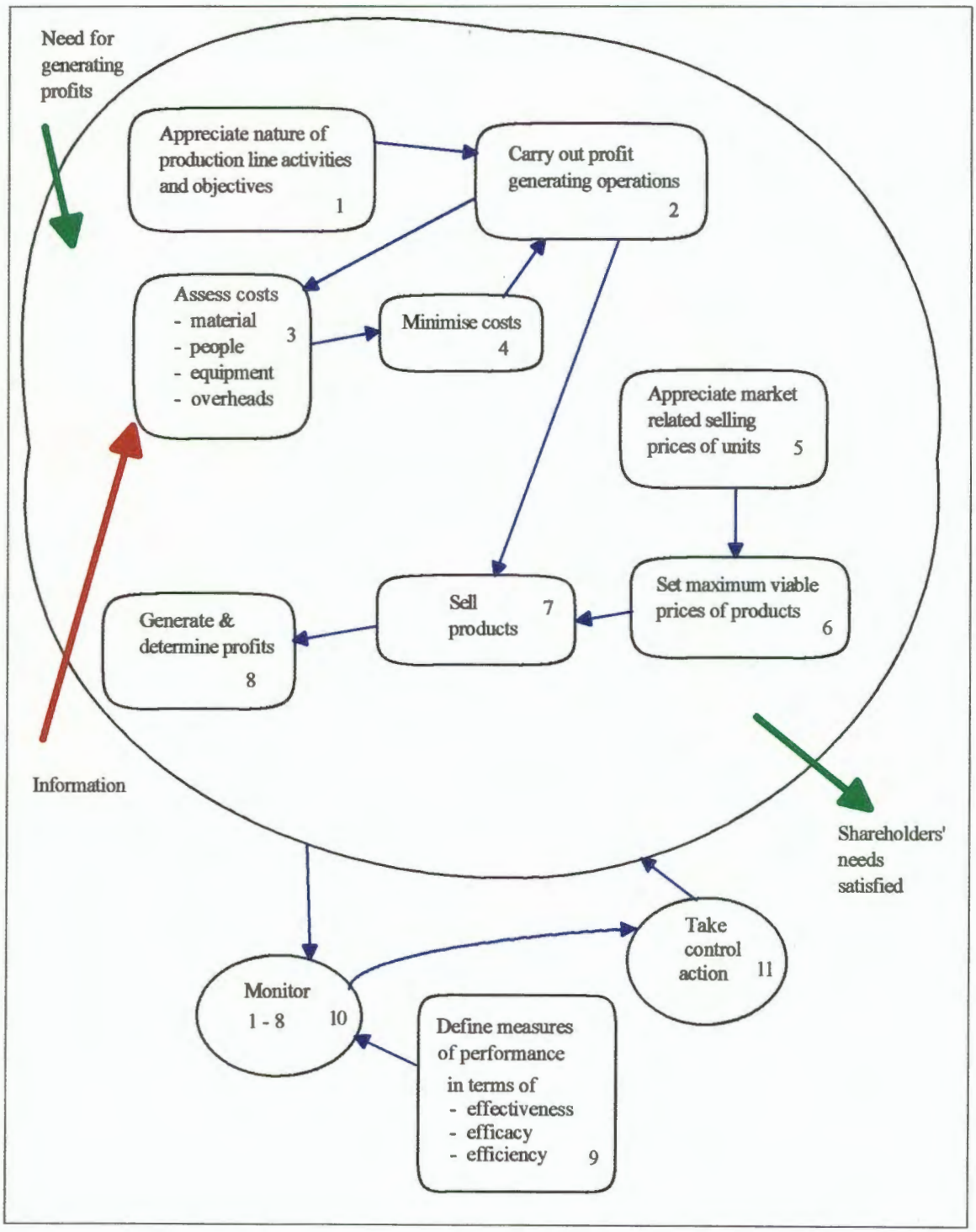


Figure 11.13 Conceptual Model of Root Definition 10

Root definition 11

'A system owned by management, and operated by management, that exploits employees, under the constraints of staff resistance and the union to which the majority of the staff members belong.'

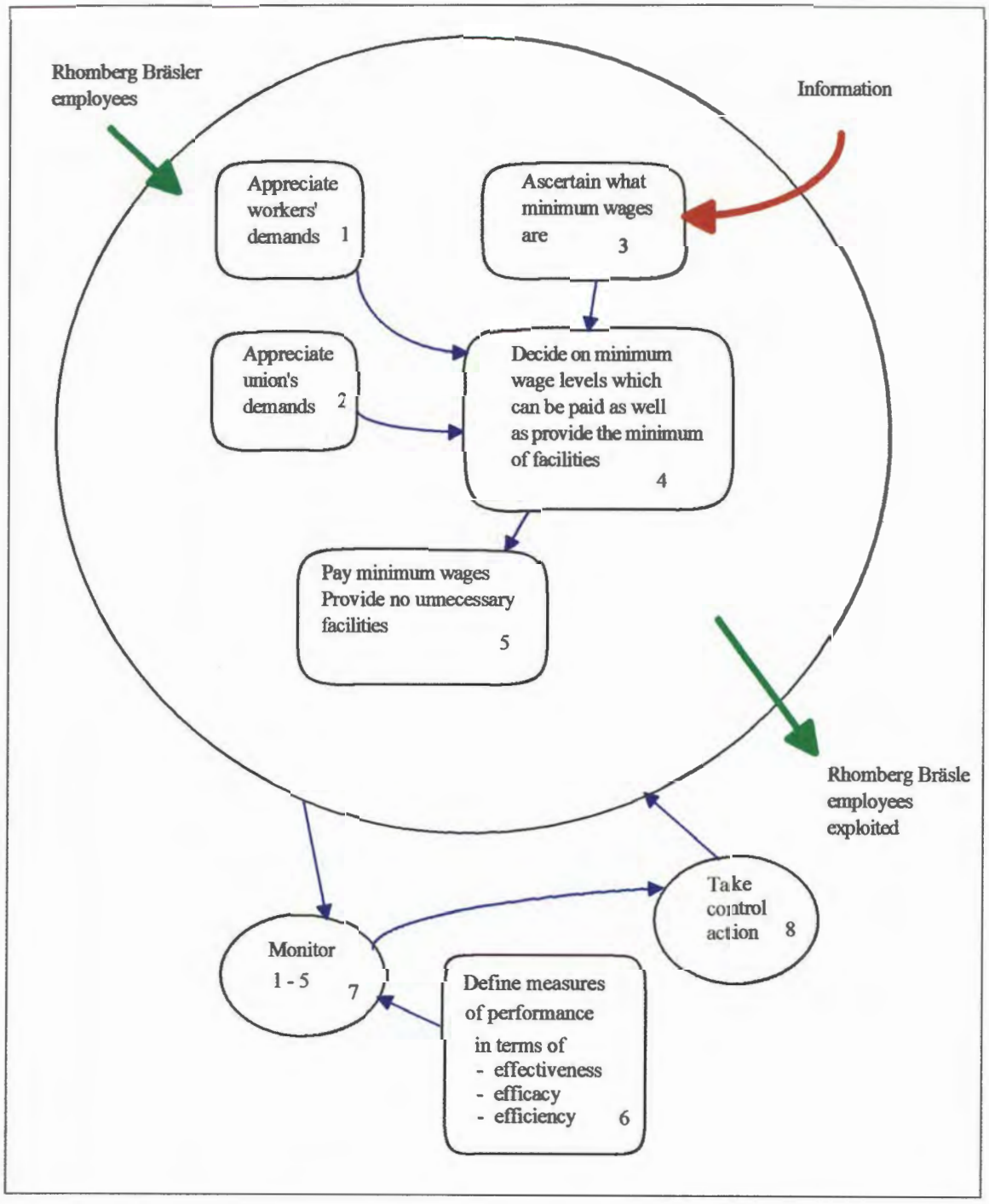


Figure 11.14 Conceptual Model of Root Definition 11

Root definition 12

'A system owned by the chairman, and operated by the chairman, management and staff, that identifies and satisfies the need for enhancing the chairman's personal image, under the constraints of management and staff pressures.'

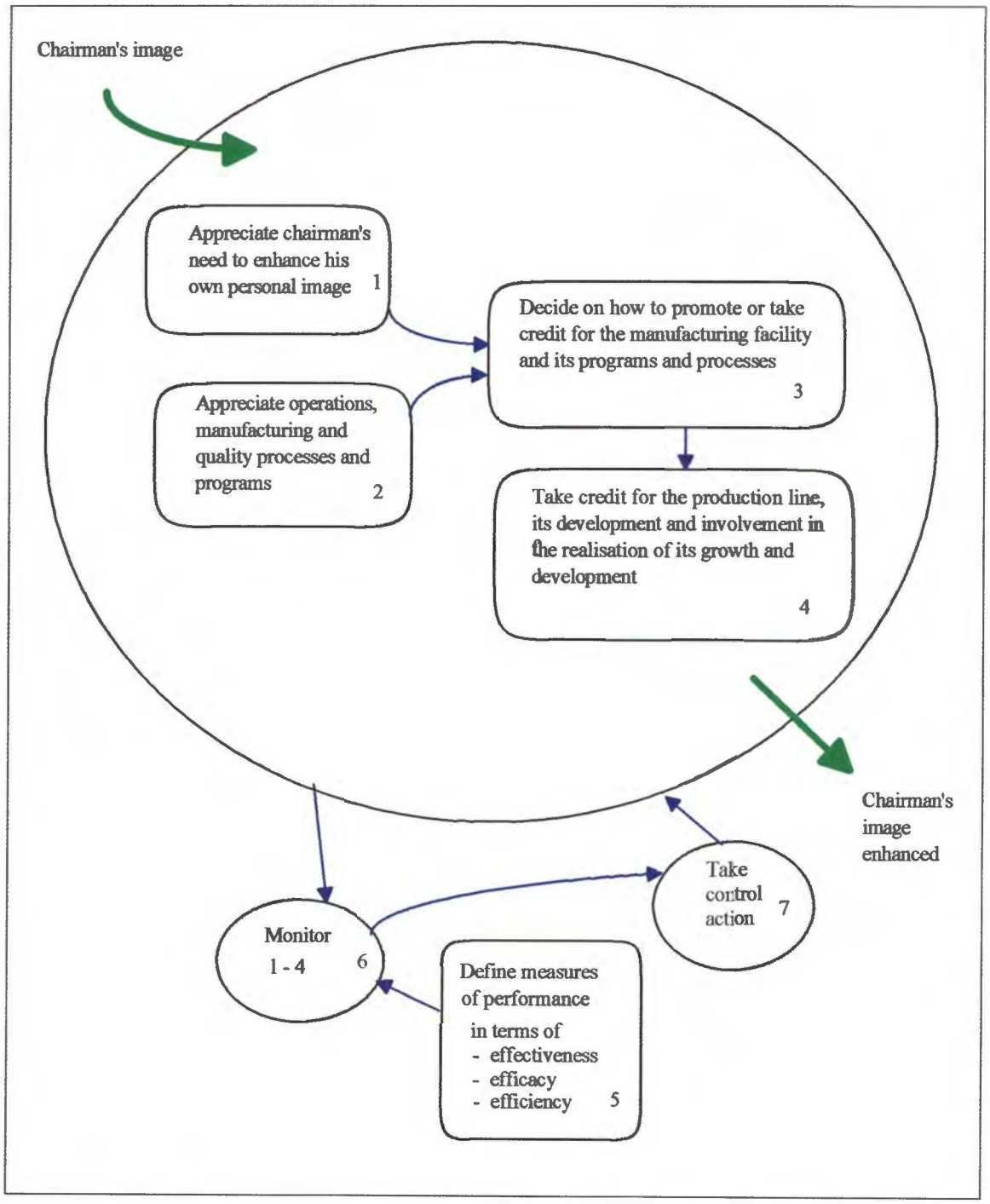


Figure 11.15 Conceptual Model of Root Definition 12

Root definition 13

'A system owned and operated by management and staff, that builds a strong and supportive relationship between management and staff, thereby increasing knowledge, understanding and respect of each other, within the constraints of limited available time and resources.'

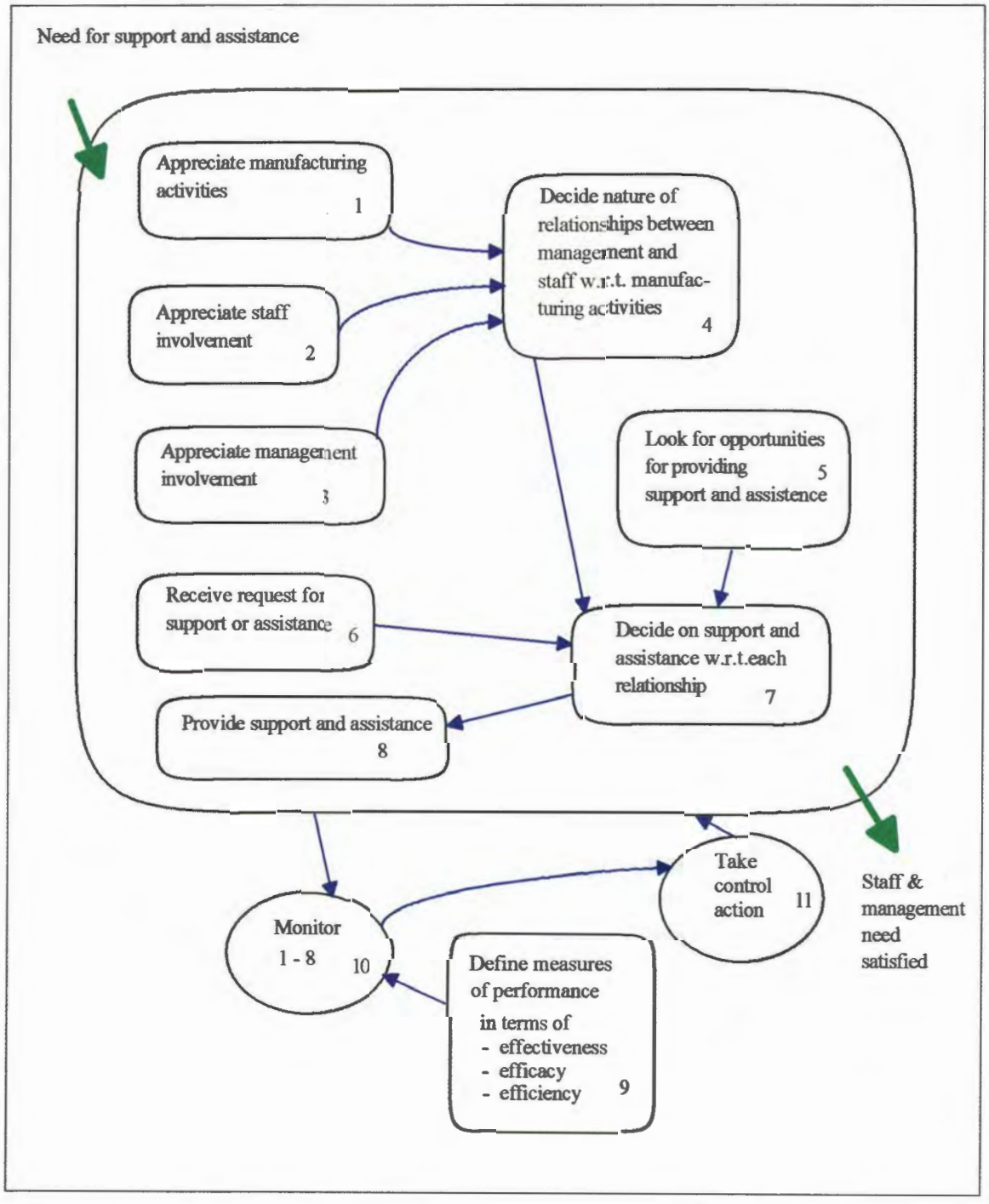


Figure 11.16 Conceptual Model of Root Definition 13

Root definition 14

'A system, owned by the company management, and operated by management and staff, that trains production staff to provide them, and ultimately the organisation, with further experience and skills, within the constraints of the production line carrying out its core activities.'

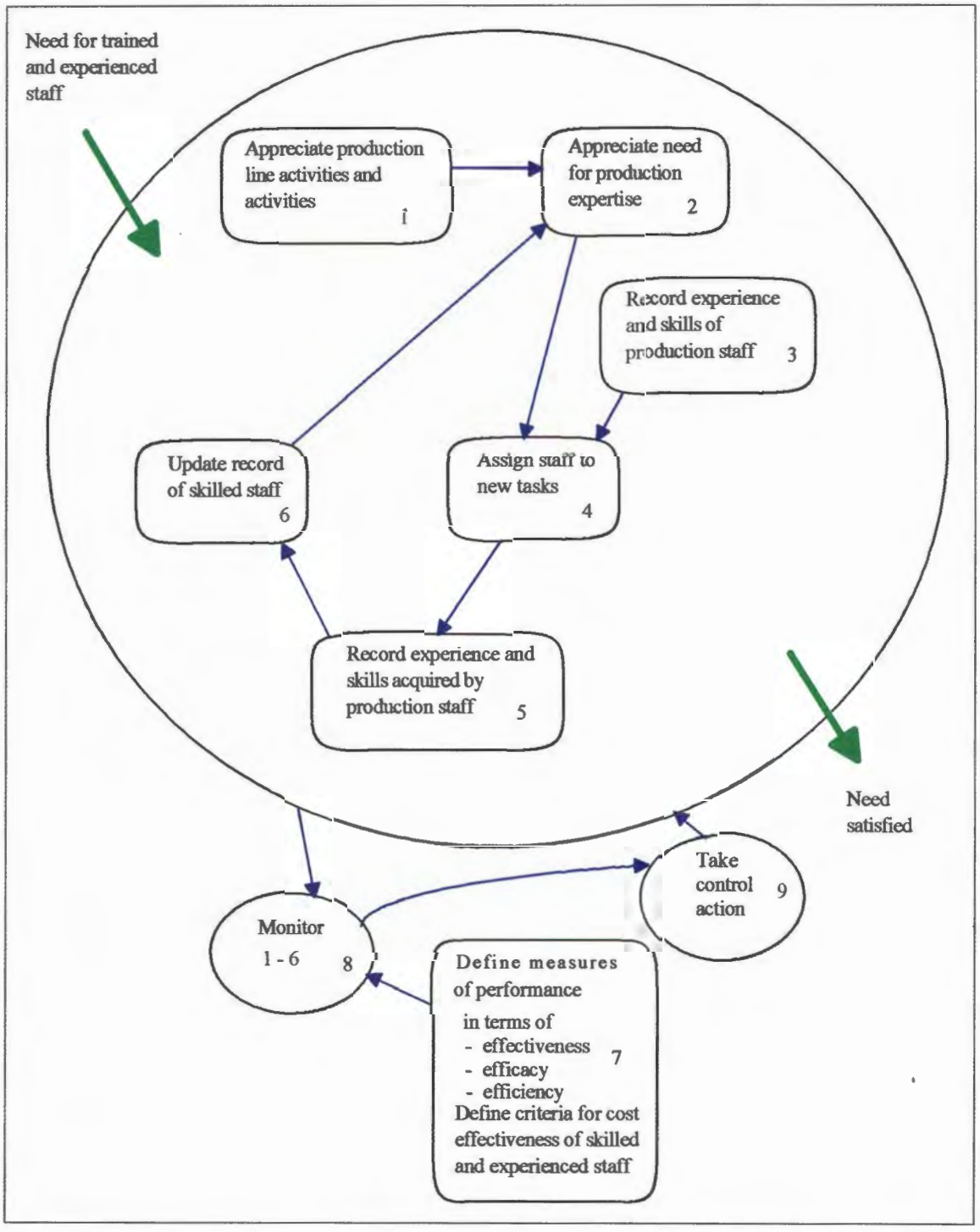


Figure 11.17 Conceptual Model of Root Definition 14

Root definition 15

'A system owned and operated by management and staff, that satisfies the need for avoiding destructive internal conflict as well as job overlaps, leading to further destructive conflict, within the constraints of the existing structures and divisions within Rhomberg Bräsler.'

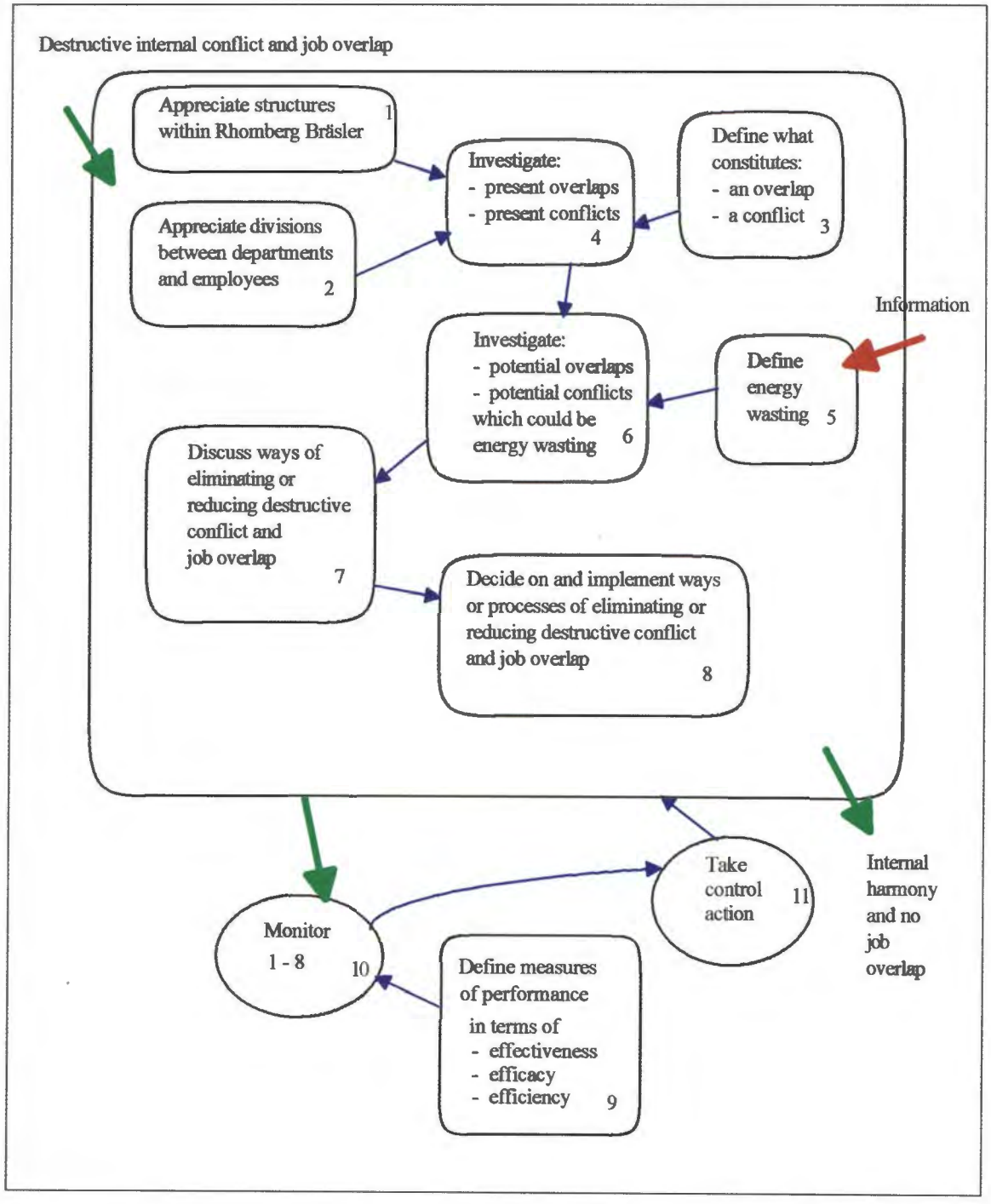


Figure 11.18 Conceptual Model of Root Definition 15

11.6 SSM: STAGE 5

As previously stated, stage 5 involves the comparison of the activities of each conceptual model with current perceptions of the problem situation in the real world.

I have chosen Checkland's (1989) most recommended method for performing this comparison. (Refer back to chapter 8 for a description of the various methods).

For each activity of the system depicted in each conceptual model, the following questions have been asked to various employees of Rhomberg Bräsler, including myself, as both employee and analyst:

- Does this system activity take place in the real situation?
- If so, how is it performed?
- By what criteria is it judged, if any?
- Are there any ideas for change?
- If so, what can be recommended?
- How can the recommendation be implemented?

A table has been constructed for each conceptual model in the format as shown below:

Comparison of Conceptual Model 'x' with the problem situation at Rhomberg Bräsler				
System activity	**Does activity take place in real situation? If so, how is it performed?**		**By what criteria is it judged, if any? / Measure of performance?**	**Comments / Ideas for change? / Recommendations / How?**
Activity 1				
Activity 2				
Activity 'y'				
Links:	1-2, 2/3-4, etc.			

See Appendix VII for the comparison of all fifteen conceptual models, with the 'real world' at Rhomberg Bräsler. Note that the tables show the answers of the questions relevant to each activity as well as indicating the links between the activities. In the table above, activity 1 immediately precedes activity 2, whereas both activity 2 and 3 immediately precede activity 4.

11.7 SSM: STAGE 6

11.7.1 INTRODUCTION

As was stated in chapter 8, the outcome of the comparison stage of SSM leads to points of discussion or debate about issues at Rhomberg Bräsler which potentially need improvement or development. Any changes proposed must be both systemically desirable (i.e. desirable in systems terms) and culturally feasible (i.e. feasible in light of the attitudes, perceptions and characteristics of the participants within Rhomberg Bräsler). However, at this stage in the SSM process, the changes should, by virtue of them emerging from the logic-based stream of enquiry, be systemically desirable. In addition, the proposed changes should, having been the result of an also intensive cultural enquiry, be culturally feasible.

Proposed changes have been categorised into changes in structure, processes and attitudes.

11.7.2 STRUCTURAL CHANGES

Once again, structural changes are long term and examples are changes to organisational groupings, reporting structures or areas of functional responsibility.

Staff Handbook - Company Policies, Procedures and Information

There is a need for the compilation of a staff handbook which is presented to each new employee when joining the company. This handbook would include detailed information such as:

- General company policies
- Hours of work
- Overtime policy
- Annual leave
- Sick leave
- Maternity leave
- Performance Reviews
- Long service awards
- Personal appointments
- Personal telephone calls
- Disciplinary procedures
- Grievance procedures

- Salary / Wage payment dates and procedure
- Incentive scheme/s (if applicable)
- Medical aid scheme
- Pension / Provident fund scheme
- Workmen's compensation
- Unemployment Insurance Fund
- Salary / wage review process
- Tax information
- Counselling information (assuming the employment of a HR manager)
- Information on importance of Quality
- Financial Counselling for staff members
- Training information
- Promotions
- In-house communication
- Notice of termination of employment
- Study assistance and study leave
- Copies of all forms that the employee might require during his/her employ with the company, such as leave forms, grievance forms, etc.

At present when there are often issues which staff, themselves, cannot resolve. There are questions that they do not have answers for. Hence, they consult members within their immediate work groups. This leads to a great deal of discussion leading to the misconception of company rules, regulations and policies. Hence, a great deal of time during working hours is often lost to heated discussion. The staff handbook would thus serve to provide all the information necessary that any staff member can consult if s/he requires any details relevant to his/her employment with the company.

The compilation of such a handbook would require a great deal of time from executive management. The research into and the writing of such a document would normally be one of the tasks of a human resources manager, in conjunction with executive management. Whoever formulates policies requires a disciplined approach. Policies, once instituted, should be adhered to company-wide to ensure fairness and minimal confusion.

Either employ a human resources manager or a set up a project team to formulate policies. This project team could consist of certain members of management as well as representative staff members, who would do the work of compiling the staff handbook in consultation with executive management.

The contents of the staff handbook could also be explained during short regular meetings with staff and management.

Training

Rhomberg Bräsler should be fully committed to the on-going training and development of its employees, including management and staff members. There is the need to develop in-house training programs as well as continually identifying external training courses that could be beneficial to Rhomberg Bräsler and its employees. The development of internal courses needs to be made the responsibility of an employee, who needs to be identified by executive management. These training courses, once instituted, need to be continually updated and revised in order to meet the requirements of modern business and technology.

However, there also needs to be an incentive for staff members to go on training courses. Most staff members have the desire to develop themselves and to learn further skills. Training courses should provide these skills as well as this personal development. A further idea is to present each employee with a certificate on the successful completion of each training course. This should hopefully make the employee feel proud for successfully completing the training course and will increase his/her desire to participate in further courses. Skills development should also lead to the employee being more eligible for future promotion. Hence, earning more salary or wages will be more of a probability in the future.

Another idea is to institute a formal orientation course for new employees as well as a company-wide training course, explaining the nature of Rhomberg Bräsler's products and services, product applications and the Rhomberg Bräsler way of conducting business.

Courses which management attend, such as courses on WCM, should be analysed afterwards for their applicability for use at Rhomberg Bräsler.

Every employee of Rhomberg Bräsler who has regular dealings with the production line, should have a good knowledge of the production process or should have easy access to information detailing the production process. This could take the form of a very user friendly document, explaining in simple terms, perhaps graphically, the production process, as well as detailed descriptions of all production line activities/tasks.

Members of management do not have as good people management and interpersonal skills as they could. They need to develop these skills - perhaps via training programs or workshops.

Restructuring of Production Management / Quality Management / Purchasing Management / Stores Management / Human Resources Management

There seems to be some degree of overlap of management responsibilities in the areas of production, purchasing, stores and quality. Production management tasks are shared between the managing director of Rhomberg Bräsler Manufacturing, the production manager and the quality manager.

The production manager is largely responsible and very much involved in the management of purchasing, supplier liaison and stores management, as well as human resources management. He thus does not spend enough time on developing or restructuring the production line and its processes.

There sometimes seem to be cases of 'passing the buck'. Continuous 'passing the buck' is also energy wasting and time consuming. Problems should rather be sorted out immediately. In addition, conflict between members of management needs to be sorted out on a continual basis in order to maintain harmonious relationships and effective management.

Executive management needs to meet with the production manager and the quality manager, and they need to analyse all production management tasks as well as tasks relating to human resources management. They need to redefine each other's job description and possible job descriptions of future employees - a human resources manager, a purchasing and stores manager, or an industrial engineer.

Production Line Development

It is necessary to revive Rhomberg Bräsler's employee grading system and to disregard the Industrial Council grades. However, it will first be necessary to compile a manual detailing all the necessary tasks on the production line as well as a step-by-step description of each task or activity. This manual should also describe the sequence of all jobs to be performed. The grading system should record skills learnt by operators, thus indicating the degree of their flexibility.

Every tool and jig on the production line should have its own place and should be stored in these places when not in use. A tidy place of work gives one the impression and

feeling of an organised and efficient operation. 'Clean-up' time should not be necessary if the line is maintained during the course of the normal production day.

When expanding the production line, in terms of employing more people, management and supervisors have expressed that it has proved more advantageous to employ inexperienced, but intelligent people. People who have had experience in electronics manufacture are generally set in their ways and are harder to influence to do things the Rhomberg Bräsler way.

The production and quality managers needs to analyse processes and responsibilities and decide on which responsibilities can be delegated down the chain of command. Quality control, for instance, can be delegated down.

Improve Effectiveness of Information Channels / House Meetings

An investigation into the effectiveness of internal formal and informal communication, needs to be conducted.

Information channels exist at Rhomberg Bräsler, which employees and management use, but there is no measure of how well information is communicated. For instance, the Chairman thinks that he is informing his employees, especially at house meetings, but they do not understand what he is trying to convey. A suggestion is to conduct smaller meetings, with groups of about ten people, rather than have house meetings (where the purpose of a house meeting is to obtain feedback from employees). It would thus be more effective to have smaller meetings which are more interactive. People, generally, are more willing to offer feedback and engage in discussion in smaller meetings. Certain management, due to their own self confidence, might not appreciate people's general fear of 'speaking up'.

Employees could on a regular basis be requested to formally think of and suggest information that they might require, or to offer suggestions for better information flow.

Management needs to devise an effective method of explaining to staff how profits are generated and re-invested to fund the company's growth, thereby securing everybody's future with the company. This could take the form of workshops or during the small meetings which replace some of the house meetings.

A further idea is to institute a process whereby staff can consult management, or vice versa, on each others' needs and expectations.

Management should ask questions to staff regularly on a formal basis, such as: "What can I do to help you to do your job better?"

Assess and Develop Company-wide Information Technology (IT)

An investigation into information needs / information technology / computer systems needs to be conducted.

Orders received form distributors and customers need to be processed in a much quicker and effective way. Look at ways of simplifying this process.

There are no IT people within the organisation. Consultants could be called in to assess the company's IT requirements for today as well as for the future.

Rhomberg Bräsler probably needs a new or upgraded information system, including more departments in using the system.

Investigate reducing time in data-capturing. A possible solution could involve the use of barcoding.

11.7.3 PROCEDURAL CHANGES

Procedural changes are changes in activities. They are more short term and dynamic, and could, for example, include changes in reporting processes or information processes.

Performance Improvement Program - Performance Reviews

The Performance Improvement Program (PIP) needs to be revised and redesigned to meet the specific needs of Rhomberg Bräsler. The following are suggestions:

- Every manager should compile a job description for each existing as well as any new staff member that joins his/her department. This description should include

details of the staff member's major tasks as well as standards against which to measure the staff member's performance. A typed copy should be presented to the staff member as well as being filed with the manager.

- The manager should then set a future date for that staff member where the staff member's performance will be reviewed. These dates should always be set and adhered to, so that the staff member can plan his/her own development within the time between performance reviews. Thus the manager must discipline him/herself to perform these reviews.
- Performance reviews should also serve to mutually decide on further job responsibilities for the staff member as well as ways of improving performance in the staff member's job. Old objectives should always be reviewed and new objectives should also b et.
- Any specific training requirements that the staff member may have, should be identified and planned for.
- Communicate more frequently, on a formal or informal basis, with staff regarding individual income needs and career aspirations.

In conclusion, management should actually take the time to assess each individual staff member and not to take their needs for granted.

Production Line Development

There is a need to improve overall manufacturing techniques. Production line development should take place on a more formal or regular basis - not only in times of crisis.

More time should be spent on obtaining more cost-effective resources. For instance, products can be individually examined to enable the use of cheaper components as well as their re-design for easier and less costly assembly.

Production methods should always be reviewed and developed. The production manager should research production techniques, via written material, videos or training courses or workshops. He then needs to experiment with changes on the production line, monitor the results of these changes, and keep an accurate record of measurements taken and assessments made. Continuous improvement will thus be the result of sequentially made improvements. Production time per product can be reduced by devising smarter work methods and effective re-structuring of the production line. For instance, World Class

Manufacturing Just-in-time (JIT) techniques could be employed (i.e. manufacture to order - not for stock). The production process needs a radical re-think. Perhaps use more partitions on the production line. The system could be more effective if the company engaged in business process re-engineering as well as in value engineering. As many non- value added activities as possible, need to be eliminated.

Market Research / Customer and Distributor Relationship

There needs to be more direct contact with customers and distributors on a more regular basis.

There is also a need to create a closer relationship with RBM, RBE and its customers. Before designing new products, NPD with the help of RBE and Export, should obtain as much information on competitor products and applications as possible (i.e. more intensive market and competitor studies). New designs should also have as much input from customers and distributors as possible.

To facilitate the incoming order process, RBE should take the time to train customers and distributors on the correct use of the ordering codes. This would facilitate RBM in the processing of incoming orders.

Management should extend more personal invitations to key customers and overseas distributors to visit the factory.

Salary Structures / Salary and Wage Incentive Scheme

More formal analyses of competitive rates could be performed. Formal salary or wage structures could be formulated so employees have a measure against which to compare their current pay package. Management should consult with staff on a more regular basis regarding salaries / wages.

Management needs to investigate and try and devise a wage incentive scheme for the production line. However, all processes and procedures need to be accurately documented. Management should also first determine whether staff actually want to take on more responsibilities, or rather which staff would like more responsibility. An incentive scheme would spur staff to be more innovative and more disciplined to only

socialise after work hours, enabling a higher productivity during work hours. Discipline would thus be improved. However, management should first obtain suggestions from management and staff.

Acknowledgement of exceptional work is not carried out effectively by management - needs to be improved - perhaps via financial reward system. Rewards should also be given for suggestions offered by staff members, that are actually used or implemented.

Management should link skills learnt to wages. This would encourage staff members to learn more skills. Hence, pay packages for multi-skilled operators would be higher.

New Product Development

New ways of re-structuring design methods and procedures in order to improve product design, maintenance and time to market, should be constantly reviewed.

It is necessary to improve motivation and efficiency within the department. It is necessary to always learn new technology relating to the process control world.

A departmental development team could be created with certain employees from NPD with the view to improve the department in order to propose and implement an incentive scheme.

11.7.4 ATTITUDINAL CHANGES

It is very important to involve staff in, and to constantly keep them informed of, any changes that might take place in the organisation. It is of paramount importance that reasons for change are explicitly explained to all staff members. Management must ensure that staff members understand the implications of these changes. Management must thus constantly request feedback from them. However, it may be difficult explaining the benefits of long term changes, in the short term.

It is important to explain to staff, the necessity of good organisation on the production line. This could be done by demonstrating a small area on the production line as a model of what the whole line should be.

The company Statement of Principles and Objectives should be reviewed and updated, as required. It is once again very necessary to obtain a great deal of input from staff members when making any changes. Management and staff should always feel free to question the Statement, and both should always ensure compliance with the Statement.

Management should try and instil a questioning culture on the production line. This means that operators should constantly be asking themselves questions such as the following:

- Is it necessary what I am doing?
- Is there not a better way of doing it?
- If yes, how could I do it better?

Management should also try and instil a hardworking and disciplined attitude in staff members. However, management might first need to instil this sort of culture and attitude within themselves.

Management should spend a great deal more time on the production line, as well as in other areas of the company, such as the mechanical workshop, actually showing an interest in people's work and providing motivation by making them feel important about the job that they are doing and to feel proud to work for Rhomberg Bräsler. This, what is commonly known as MBWA (Management By Walking Around), however, must be sustained. It is unacceptable that management offers the excuse that they are too busy to perform this task. There is so much time wasted by managers, such as in long extended meetings, that could be of far more value performing tasks such as MBWA. An environment that provides no motivation, produces unproductive workers. Thus workers must be kept motivated on a continual basis. Management often expresses that they appreciate what the people on the production line are doing for the company. However, do they show it?

When members of management, especially executive management, do appear on the production line, it is generally viewed by staff as for reasons of one of the following:

- Management needs to sort out a problem.
- Management is looking for somebody.
- Management is showing guests the production process.

Employees' attitudes should be monitored on a regular basis by means of interviews or questionnaires.

11.7.5 CONCLUSION

The results of the research of this thesis, presented in stage 6 of the process of SSM, consist of a set of rules, or proposals and recommendations, in terms of structure, processes and attitudes. These set of rules are the basis for the next phase of SSM (i.e. stage 7 - 'Implementation'). They are rules for action.

11.8 SSM: STAGE 7

Stage 7 of the process of SSM involves the implementation of the proposed changes that are systemically desirable as well as being culturally feasible. However, the scope of this thesis is limited to proposing these changes and does not include reports on the degree of success of any implementation made. However, the set of rules were tested against the opinions of the stakeholders at Rhomberg Bräsler. That is, the proposed structural, procedural and attitudinal changes were presented to, and discussed with, various of the participants in the problem situation, who were interviewed previously. Various issues were debated and most of the proposed changes were unanimously supported. However, the following amendments to the proposed changes, and the following problems and difficulties with regard to the proposed changes, were generally agreed upon:

Changes with regard to 'Production line development' and 'Training' were split into two categories. However, a great deal of the training on the production line could take place while experimenting with each area of the production line. While changes in structure and/or processes are made with respect to a certain area on the production line, management must train staff in performing their tasks within the new changes. However, it is imperative that management obtains as much involvement as possible from the people involved in that area. Management needs to work in conjunction with the staff. If procedures are simply imposed on people, there will always be resistance.

In addition, before any changes or experiments take place, small workshops with staff should be held to explain ideas, such as WCM and JIT, reasons for change and advantages of new techniques. As much involvement as possible must be obtained right from the beginning.

The proposed booklet explaining the production process in a simplified format, would be more effective if it took the form of visual graphic posters or displays on the production line.

Management needs to have better timekeeping, especially with regard to meetings.

Staff working on the production line, should constantly be urged by management to decide themselves how to perform tasks in the best possible way. Production management should play more of a consultative role with respect to management of the production line staff, as opposed to simply instructing staff members what to do.

It was decided that in order for responsibilities, such as quality control, to be delegated down the chain of command, attitudes of the production line staff will have to change. For instance, an awareness of the importance of quality needs to be created. Management needs to sustain the promotion of quality awareness.

Another suggestion made was to eliminate the use of bells, time clocks and clock cards where the attendance of production line staff is controlled and monitored. In order to change the attitude of production staff, it is important for management to first prove to them that they are trusted. Eliminating control would in all inevitability, achieve attitudinal change.

Production staff should be taken to customers in order for them to see Rhomberg Bräsler products in action. It would provide a much richer perspective to their individual jobs.

The Rhomberg Bräsler Statement of Principles and Objectives could be more visual. This document needs to promote the importance of staff members to the company. It needs to explain, explicitly, where staff members, as a whole, fit into the 'whole picture'.

People are stuck within their existing paradigms. In order to change or alter these paradigms, they need to be shown something different which will convince them that something else is better. People need to feel that they are on the same level as everybody else in the company. This could be aided by eliminating reserved parking bays, time clocks etc.

With regard to MBWA, it is very important for the Chairman, i.e. Peter Bräsler, to make regular appearances on the shop floor, showing a great deal of interest in people's jobs. 'A lack of time', is no excuse for neglecting this task. In certain instances, he needs to 'get his hands dirty' in order for him to demonstrate that he is not superior to them.

After discussing and debating all the possible changes, there was still one major issue, with regard to the procedural changes proposed, that could not be resolved:

It was suggested that every manager should compile a job description for each existing, as well as for any new staff member that joins his/her department and that this description should include details of the staff member's major tasks as well as standards against which to measure the staff member's performance. In order for a wage incentive scheme to be fairly administered, it is important to have standards against which to measure performance. However, it is very important to stress that the tasks which make up a job description should only serve as a guideline, in order not to hinder innovation and the opportunity to become multi-skilled.

As a result of making changes, especially with the implementation of an incentive scheme, the company will probably be negatively affected, in the short term. However, in the long run, organisational change will most likely prove to be very successful.

11.9 SYNTHESIS

Stage 7 (i.e. Implementation) has taken place in the form of testing the proposed changes against the opinions of the stakeholders at Rhomberg Bräsler. These proposals were categorised into changes in structure, processes and attitudes. The majority of changes were unanimously agreed upon. However, there were a few proposed changes that needed to be debated in order to reach agreement. The end result was a slightly modified plan for implementation which was unanimously anticipated to provided effective results at Rhomberg Bräsler.

However, for any changes in structure and processes to be effective, it is first necessary to achieve changes in attitudes (i.e. to alter people's paradigms), to concentrate on cultural issues in the organisation, to develop relationships and to improve communication.

The hypothesis as postulated in chapter 2, is presented once again:

> *For an emerging small company developing into a corporate structure, it is necessary for wide-scale organisational change to occur. However, this change must be managed systemically, taking the viability of the organisational structure and processes into account. It is also imperative for the attitudes of the people of the organisation to change, before implementing changes that will be sustained.*

It has been shown that Rhomberg Bräsler, i.e. an emerging small company developing into a small corporate structure, needs to undergo a process of organisational change in order to maintain growth while developing effectiveness in order to ultimately achieve performance. However, this process must be managed systemically, as this thesis has shown, while ensuring cultural feasibility.

Therefore, the proposed hypothesis is considered to be true. Furthermore, the research performed at Rhomberg Bräsler is ecologically valid. That is, it is possible to generalise from the actual social context in which the research took place, i.e. at Rhomberg Bräsler, to other contexts or settings, i.e. other organisations..

CHAPTER 12

CRITIQUE OF THE LITERATURE REVIEWED AND OF THE USE OF SOFT SYSTEMS METHODOLOGY

Note: At various stages throughout this thesis, a critique on the literature has been provided, which may or may not be repeated or elaborated upon, in this chapter.

Referring back to chapter 1: Description of the Problem Situation, a very general and broad outline of the problems being experienced at Rhomberg Bräsler, from a narrow perspective, was presented. As it was management's desire to transform the company into a 'World Class Manufacturing (WCM)' organisation, the literature on WCM was reviewed. This review outlined the main techniques and principles of WCM. However, the review also revealed evidence that the many techniques and principles, which were emulated from other companies, or from books, and simply introduced in an organisation, seldom result in expected improvements. The necessity to be committed to obtaining the involvement of everybody in the organisation, as well as providing motivation and people development, before embarking on any process of organisational change, was thus realised.

It was initially clear that the problems being experienced at Rhomberg Bräsler were complex and could not be accurately defined. It was thus realised that a more lateral look at the problem situation was required. It was also realised that Rhomberg Bräsler can be conceptualised as a complex system which consists of systems within larger systems. It

became necessary to investigate the relationships and the interactions between the parts of the system, as well as investigating the parts themselves. Ackoff (1995) supports this view by stating that manipulating the parts of the whole must always be performed with primary focus on the performance of the whole and not on the performance of the parts involved. Hence, the literature on Systems and Systems Thinking was reviewed.

It was through this that I was introduced to an alternative way of thinking and dealing with complexity - Systems Thinking. However, being a novice, I required some sort of guideline or structured approach at tackling the problems being experienced. Hence, a process, introduced by Flood and Jackson (1991), called 'Total Systems Intervention (TSI)', was employed in order to define the nature of the problem situation at hand, with a view to selecting a systems methodology for use at Rhomberg Bräsler.

With the use of TSI and metaphor analysis, the problem context at Rhomberg Bräsler was categorised as 'complex-pluralist'. This discovery facilitated me in choosing Soft Systems Methodology (SSM) as the most suitable systems methodology for resolving the issues at Rhomberg Bräsler.

Flood and Jackson (1991, p244) have been criticised that their TSI approach is more philosophically than practically oriented. However, they argue that they are "more practically oriented than most managers" because they are "only being realistic about the nature of organisational and societal difficulties or complexities". Recognising that organisational issues are always more complex and not accurately definable when addressed at face value, the TSI analyst is more competent than the regular 'manager' to handle realities in a manner which is more relevant.

While compiling this thesis, a great deal of time was spent on performing organised 'finding out' (i.e. stage 1 of the process of SSM), primarily involving interviewing with and observation of the participants in the problem situation.

Due to my lack of experience in using SSM, it was difficult to decide on which issues should be regarded as fundamental issues and which should be regarded as 'everyday'

moans and complaints. In my approach, I tended to hone in on issues that were raised by more than one person in the problem situation. One tends to conclude that if a number of people have the same view of a certain issue, then that view must be correct. However, there could be the case where one particular view, being the 'correct' one, is disregarded in the process of identifying and resolving organisational issues.

Thomas and Lockett (1991, p95) say that "there is very little discussion in any of the papers on the methodology about the validation of the "expression" stage." In addition, Checkland and Scholes (1990, p31) say that "no human activity is intrinsically relevant to any problem situation, the choice is always subjective. We have to make some choices, see where the logical implications of those choices take us , and to learn our way to truly 'relevant systems'." Hence, the systems that I have considered relevant, are neither correct choices nor incorrect choices.

However, Checkland and Scholes (1990, p31) express that "if a user of SSM is adopting the approach in the day-to-day situation, then it is likely that s/he will feel that they know a lot about the situation and can get straight to the logic-based stream of thinking", that is choosing, naming and modelling relevant systems and comparing them to perceptions of the real world situation.

Thus, as an analyst, I believe a major criticism of the use of SSM is that I was never sure whether the root definitions that were formulated, and the conceptual models that were constructed, were actually derived from the problem situation expressed. It was also very difficult to determine when to stop formulating root definitions and constructing conceptual models prior to 'going back to the real world' and performing comparisons with the conceptual models. I think that it would be better to perform some comparisons before constructing all the conceivable models. By moving backwards and forwards between the modelling of different conceptual models, the likelihood of mis-modelling, is reduced. Thus, models can be modified as learning in the problem situation develops. Both Checkland and Patching agree that this may be a suitable idea. However, the analyst must have the ability to disregard what occurs in the 'real world', when engaging in systems thinking stages.

For instance, Patching (1990, p85) says that

> "analysts are reluctant to put pen to paper and draw a rich picture, particularly when they are newcomers to the strange world of systems thinking. The same applies when first attempting to construct a conceptual model; there is often some apprehension that the model may be 'wrong', or at best, misleading. Once again, this reflects the nature of SSM; because it is not aimed at describing or engineering an actual system, but is concerned with encouraging learning, the modelling technique does not have to be precise. Consequently there are no 'good' or 'bad' models , although some will be more appropriate and better constructed than others."

The use of SSM in this thesis was limited to formulating root definitions and conceptual models for only one level of resolution. However, to enable a much richer study of a problem situation, the analyst should expand each conceptual model to further levels of resolution. Checkland (1981, p292) advises that " each conceptual model which expresses *what* the system does, for example, can be expanded into a group of models which express possible *hows*."

Measures of performance in terms of efficiency, efficacy and effectiveness, also need to be examined for all the activities of each conceptual model. In this thesis, the task of formulating measures of performance for activities, especially for issue-based conceptual models, was covered in a very brief manner. However, in all the literature reviewed on SSM, especially that which deals with SSM in action, there are not a great deal of applications detailing the modelling of measures of performance, nor explaining the comparison of the 'performance models' with reality. Hence, I regard setting measures of performance for activities of conceptual models, as well as comparison with the real world, a weak area in the use of SSM. Nevertheless, a comparison of measures of achievement for the VSM and performance measures of SSM was performed, which helped to clarify the differences between efficiency, efficacy and effectiveness as well as

the importance of each, in terms of their relevance to organisational performance.

As the scope of this thesis has been limited to proposing changes, it does not include reports on the degree of success of any implementation made. However, the proposals, in terms of structure, process and attitudes, were tested against the opinions of the stakeholders at Rhomberg Bräsler. That is, they were presented to, and discussed with, various of the participants in the problem situation, who were interviewed previously. Various issues were debated and most of the proposed changes were unanimously supported. However, there was one issue which was difficult to resolve: The compilation of job descriptions for the purpose of implementing an incentive scheme, was proposed. This was, however, considered to be contradictory to the whole issue of spurring innovation and allowing production staff to perform tasks in the way which they think is best, as well as the issue of building up a trust between management and staff.

Although the hypothesis was proved to be true, it was based on the testing of the proposals made against the stakeholders at Rhomberg Bräsler, in lieu of actual implementation. As a result it is difficult to accurately determine the success of this study, using SSM.

Checkland (1981) says that during initial work of stage 6 of the SSM process, inadequacies in the initial stages of the process are realised and it may be necessary to pass through several iterations of the process before actually discussing possible changes.

As was stated in chapter 8, the process of SSM can, however, never be complete, because the implementation of changes alters the initial perception of the problem situation. If one were to cycle through the process again, after making changes to the organisation, a different outcome could be expected.

The primary aim of an SSM study is, not to solve problems, but rather to improve a certain problem situation. SSM deals with 'soft' or 'ill-defined' situations, where the initial objective in making improvements is to decide what issues need to be addressed

Checkland and Scholes (1990, p44) express the following:

"No matter how the models are used for a comparison with the real world, the aim is not to 'improve the models' - as management science enthusiasts sometimes tend to think - it is to find an accommodation between different interests in the situation, an accommodation which can be argued to constitute an improvement of the initial problem situation."

Another criticism that I have of the use of SSM is that improvements, proposed in social situations, cannot be performed in isolation. Cybernetic laws must be obeyed when dealing with complex organisations. The Viable Systems Model (VSM) and Viable Systems Diagnosis (VSD), as reviewed in chapter 9, could be used simultaneously with SSM in an attempt to also achieve compliance with cybernetic criteria. VSM and VSD, and SSM, could thus be used in conjunction with one another. Flood and Jackson (1990) provide similar criticisms.

I believe that an intense study using SSM will have a positive influence on the worldviews, or Weltanschauungen, of the participants in any problem situation, however, the organisational structures and processes need to be organised in such a way, as to allow for these positive changes in worldviews to occur.

The literature on SSM expresses that the effective use of SSM requires a great deal of participation and involvement of all the participants in a problem situation. However, in a large organisation, where there are different people who interact with each other and need to coexist in harmony, in order to be effective, there will always be numerous different points of view of a particular situation. An intense study would thus require the input and views from all these people, which in the modern and busy world of today, is not always practical. Flood and Jackson (1991, p189) share this criticism when they say that "failure to establish the grounds for genuine participation means that the methodology will always serve those with power in the situation." Thus, it is imperative that one ensures the participation of those participants who usually don't get involved in dealing with any organisational issues, in addition to involving those with power.

However, Thomas and Lockett (1991, p93) say:

> "any system methodologists concerned with management, and hence decision-making, must have as their clients those who already have some power in the problem situation. For one thing, if they do not, then there is no possibility of the methodology being effective, and, for that matter, no possibility of any action-research results being validated."

In addition, Jackson (1991, p129) substantiates that it will always be difficult to obtain maximum participation, as there will always be stakeholders in the situation who will feel threatened by the possibility that the strength of their position, in terms of power or status in the organisation, may be reduced.

CHAPTER 13

SELF CRITICISM AND PERSONAL LEARNINGS

Studying on a part-time basis has been a very challenging and beneficial experience. Performing a study in an organisation of which I am a part, has enabled me to view the organisation from a totally new perspective. This has given me a much richer understanding of the events and underlying issues that prevail within the organisation.

As a project leader at Rhomberg Bräsler, or as a potential future manager in any organisation, I believe that, as a result of engaging in this thesis, I have developed the following attributes and improved the following skills:

- Attentive listening.
- Approaching and dealing successfully with people on different managerial levels.
- Being more open-minded - more willing to listen to other perspectives or issues.
- Structuring my thoughts in a more organised manner.
- Writing techniques.
- Understanding my reasoning processes.
- Confidence in dealing with many organisational issues.

As a result of this thesis, I hope that I have established more credibility in the organisation, in my present position as a project leader and that it will positively impact on any future managerial positions that I may hold.

This thesis has enabled me to realise that different worldviews, or paradigms, will always

exist in the real world, the importance of which must all be appreciated. Taking more than one viewpoint of the problem situation, which 'traditional thinkers' generally do not consider, has proven to be an 'eye-opener', especially by enabling me to think more laterally about certain situations and to see issues through the eyes of others.

Generally, it is the issue based conceptual models that are original to systems thinking. If it were not for the process of SSM, I would never have considered the production process, for instance, to be viewed as a 'system to enhance the company's image'. Most of the conceptual models constructed, pertaining to the production process at Rhomberg Bräsler, were issue based, and have thus given a whole new perspective to thinking, i.e. thinking as broadly as possible.

Due to the great deal of time that it takes to interview participants, I selected a few, representative of different areas in the organisation. By interviewing many more people in the problem situation, and enlisting greater participation in the whole process, I believe that I would have been able to provide a richer and more meaningful a study of the problem situation at Rhomberg Bräsler. However, I also do realise that my thinking will always be influenced by my own Weltanschauung, or world view, especially by virtue of the fact that I am an engineer in practice, dealing primarily with 'hard' issues (i.e. issues involving the achievement of pre-determined objectives).

Reviewing the literature on systems thinking, systems theory and systems methodologies, has resulted in my becoming less overwhelmed with the undefined, complex issues that arise in the organisation and has enabled me to take a more open-minded, yet structured approach to 'whole-ing the parts' and 'righting the wrongs'. (Ackoff, 1995).

CHAPTER 14

CONCLUSIONS

Soft systems thinking "will appeal to all those people in any discipline who are knowledgeable enough to know that there is much they do not know, and that learning and re-learning is worthwhile." (Checkland, 1981, p285).

Soft Systems Methodology (SSM) provides creative solutions that "enable organisational actors to escape the "traps" into which their current thinking has led them." (Flood and Jackson, 1991, p190).

SSM is a "methodology for rational intervention in human affairs" and seeks "accommodation among conflicting interests." (Checkland, 1991, p67).

These are just a few more short statements, attempting to briefly encompass the uniqueness, or usefulness, of SSM as a problem solving methodology.

In conclusion, SSM was introduced as a result of the unsuccessful application of systems engineering, designed to meet specific objectives, to resolve complex, messy or ill-structured (i.e. 'soft') real-world issues, or problem situations.

However, hard systems thinking (i.e. systems engineering) must not be disregarded altogether. Hard systems thinking is still required in certain instances, especially where objectives or goals to be met, are pre-determined. However, most situations in real-world organisations involve people. People, naturally have their own perceptions of events and situations. Hence, soft systems thinking is necessary in these situations. This is

substantiated by Checkland's belief that "it would be wrong to regard the newer thinking as in some way replacing the earlier, and equally wrong to imagine that the "hard"/"soft" distinction defines two groups of people: it defines two sets of ideas, which anyone can use." (Checkland, 1991, p70).

The process of SSM starts with 'finding out' about a problem in a particular problem situation and then comprehensively applying the methodology. This will hopefully result in the taking of positive action in the situation.

The difference between the SSM process and the process of other methodologies, lies in the explicit use of soft systems thinking stages during the SSM process. This systems thinking allows for a broader, more lateral and open-minded view of a problem situation.

Checkland (1991, p71) reiterates that "the "soft" tradition regards system models as models relevant to arguing about the world, not models of the world; this leads to "learning" replacing "optimising" or "satisficing"; this tradition talks of the language of "issues" and "accommodations" rather than "solutions"."

A major problem in resolving organisational issues, is actually identifying or defining the problems, or issues, at hand. However, SSM endeavours to achieve this. Once a problem, or issue, is identified or defined, it is far easier to embark on a process of successfully resolving those issues.

In summary, SSM is a powerful aid to identifying and resolving organisational issues. SSM is performed through a cyclical process of 'finding out', or identifying, organisational issues from varying perspectives, constructing models, systems thinking and comparison of the models with the real world, involving discussion and debate, leading to greater participation and learning, as well as taking action to provide for successful results.

However, SSM does not guarantee final answers or solutions, which are correct and accurate. As stated before, it is intended to provide for participation, learning,

accommodation and better understanding of any situation in which problems are perceived, from varying perceptions.

This thesis has illustrated the usefulness of taking a systems approach to identifying and resolving organisational issues, which was demonstrated at Rhomberg Bräsler. The process of SSM was applied at Rhomberg Bräsler to involve all those concerned with the 'problem situation', in order to try resolve the issues, defined not by the company management, but from an analysis of the opinions and perceptions of all those involved, i.e. from executive management to shop floor staff. The outcome of the process of SSM at Rhomberg Bräsler has provided proposals for change in the organisation in terms of structure, processes and attitudes. By simulating implementation of these proposals, i.e. by testing them against the opinions of the stakeholders at Rhomberg Bräsler, it was concluded that an emerging company, such as Rhomberg Bräsler, developing into a small corporate environment, needs to undergo a process of organisational change to maintain growth while developing effectiveness, in order to ultimately achieve performance. However, this process must be applied systemically, as this thesis has shown, while ensuring cultural feasibility.

APPENDIX I

BACKGROUND TO THE COMPANY: RHOMBERG BRÄSLER

Founded in 1970 by Austrian engineer Armin Rhomberg, Rhomberg Electronics traded as a third party supplier of electrical and electronic goods. In 1980 Rhomberg Electronics began its own manufacturing facility, producing monitoring relays, such as timers and power monitors, and as early as 1984 managed to enter its first overseas market in Chile.

Rhomberg Electronics grew at a steady pace and became known in the South African market as a major supplier of timers and other industrial automation products. However, under the direction of Armin Rhomberg, the company began experiencing developmental problems. He was unable to relinquish operational duties, because of his inability to delegate responsibility.

In 1985, Peter Bräsler joined the company, which then became Rhomberg Bräsler Electronics. Coming from the commercial market as a chartered accounted, Peter Bräsler had a distinct advantage over Armin Rhomberg in the areas of experience and business acumen. He immediately had the vision to develop the company by gaining more market share than any other supplier of its type in South Africa, as well as becoming a 'world player' in the global markets. He began to develop the company's line and support functions, while

setting goals and engaging in strategic planning. Peter Bräsler, unlike Armin Rhomberg, was able to concentrate on organisational development.

Inevitably, the conflicting management styles of the two partners resulted in Armin Rhomberg leaving the company. Since then, the company has acquired other shareholders. However, Peter Bräsler is today the major shareholder.

In 1986, the newly formed company embarked on a long process of development into a large and successful supplier of high volume commodity electronic products to the process control industry, while recognising at that stage, the importance of striving for excellent quality and customer support.

In 1990, the organisation formed two separate companies: Rhomberg Bräsler Electronics (RBE) - the sales and marketing company, and Rhomberg Bräsler Manufacturing (RBM) - the manufacturing company, encompassing all other company functions.

Today, Rhomberg Bräsler is a well known designer and manufacturer of industrial automation products. Rhomberg Bräsler supplies and services customers in over twenty countries worldwide through independent operating subsidiaries (in Chile, Argentina and Switzerland) or national distributors.

Rhomberg Bräsler products are classified into three broad areas:

1. ***Slimline***, a range of 11-pin plug-in monitoring relays, incorporating power monitors, electronic timers and process control modules.

2. ***Detechtor***, a range of proximity sensors incorporating all major sensing technologies (inductive, capacitive and opto-electronic), a variety of techniques (Namur, AC, DC, PNP, NPN) and a multitude of shapes and sizes.

3. ***Thermoline***, a range of programmable 48mm x 48mm panel mounted PID temperature controllers.

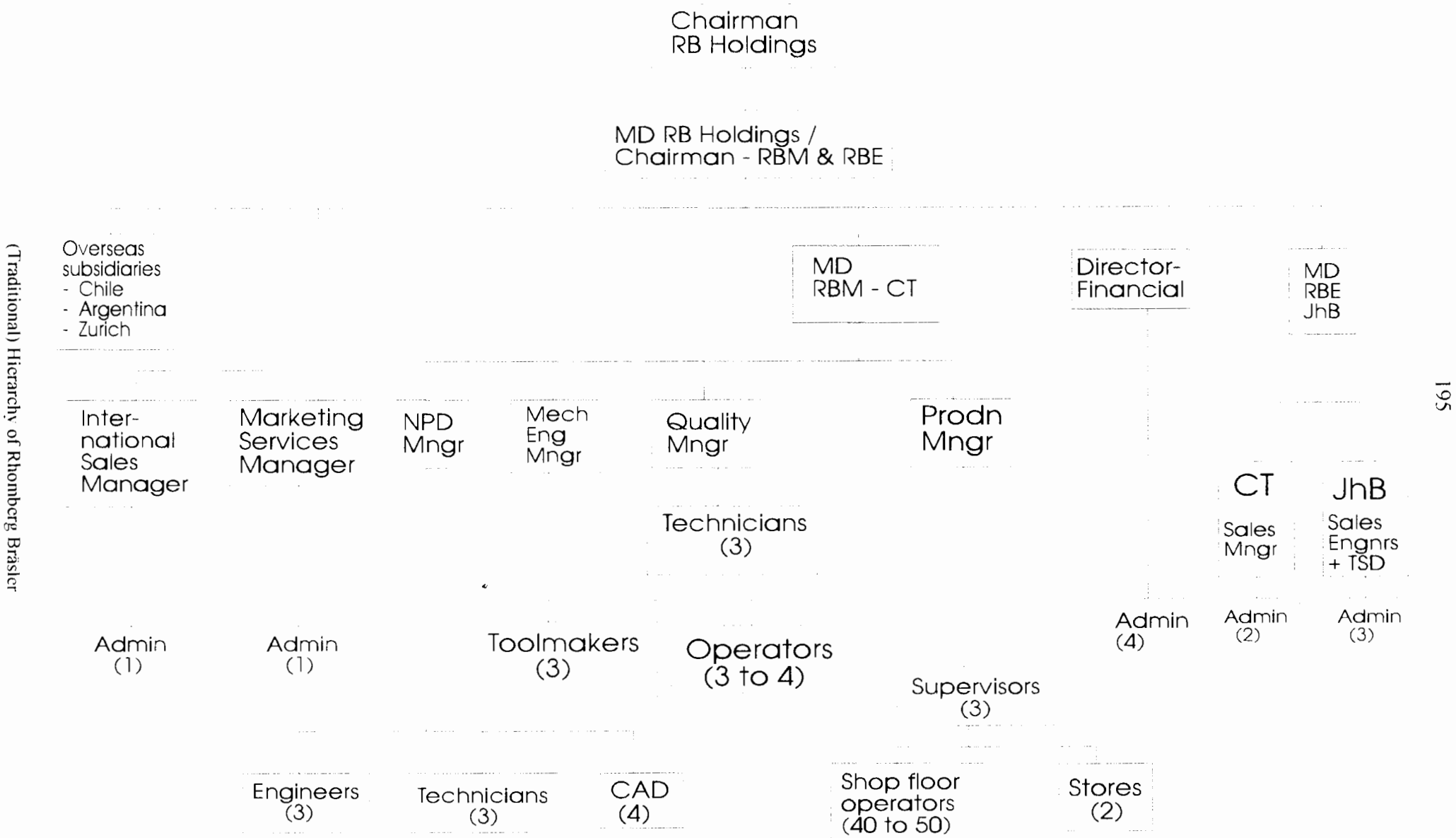
4. ***Countaline***, a range of programmable counters.

Rhomberg Bräsler Manufacturing (Pty) Ltd incorporates the manufacturing function of the company. All production activities take place at the head office and factory complex in Cape Town. The factory staff includes approximately 40 production operators. Three supervisors manage different parts of the production line. There is a separate Mechanical Engineering department on the production line, made up of four tool makers and two to four machine operators. However, the primary function of one of the toolmakers is to manage the section. None of the supervisors is involved in this department. The three supervisors report directly to the production manager, who in turn reports to the managing director of Rhomberg Bräsler Manufacturing (RBM). However, production management duties are shared by the production manager and the managing director.

Refer to Appendix II for a diagram of the (traditional) hierarchy of Rhomberg Bräsler, as it is today, illustrating the position of, as well as the number of people in each department.

APPENDIX II

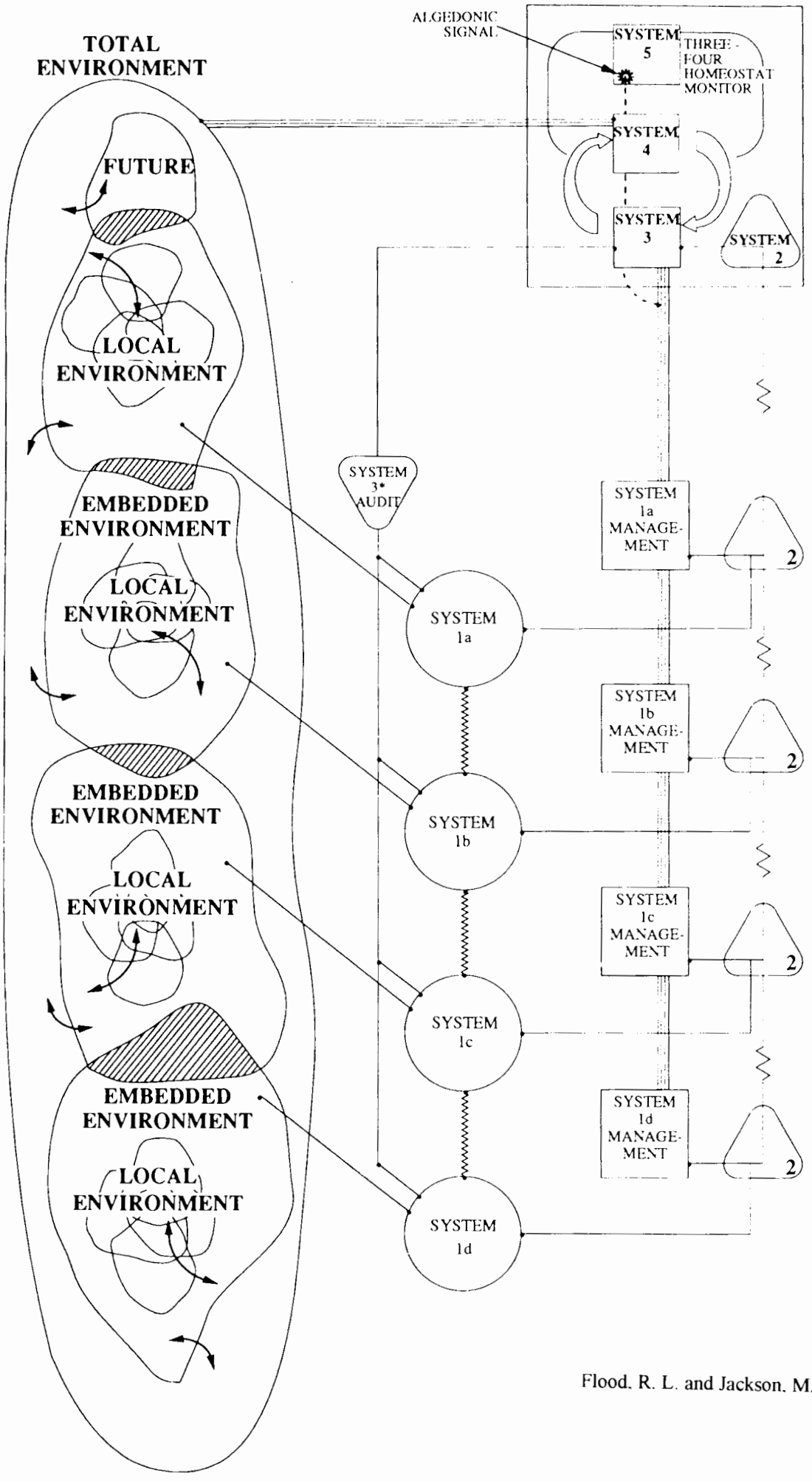
(TRADITIONAL) HIERARCHY OF RHOMBERG BRÄSLER



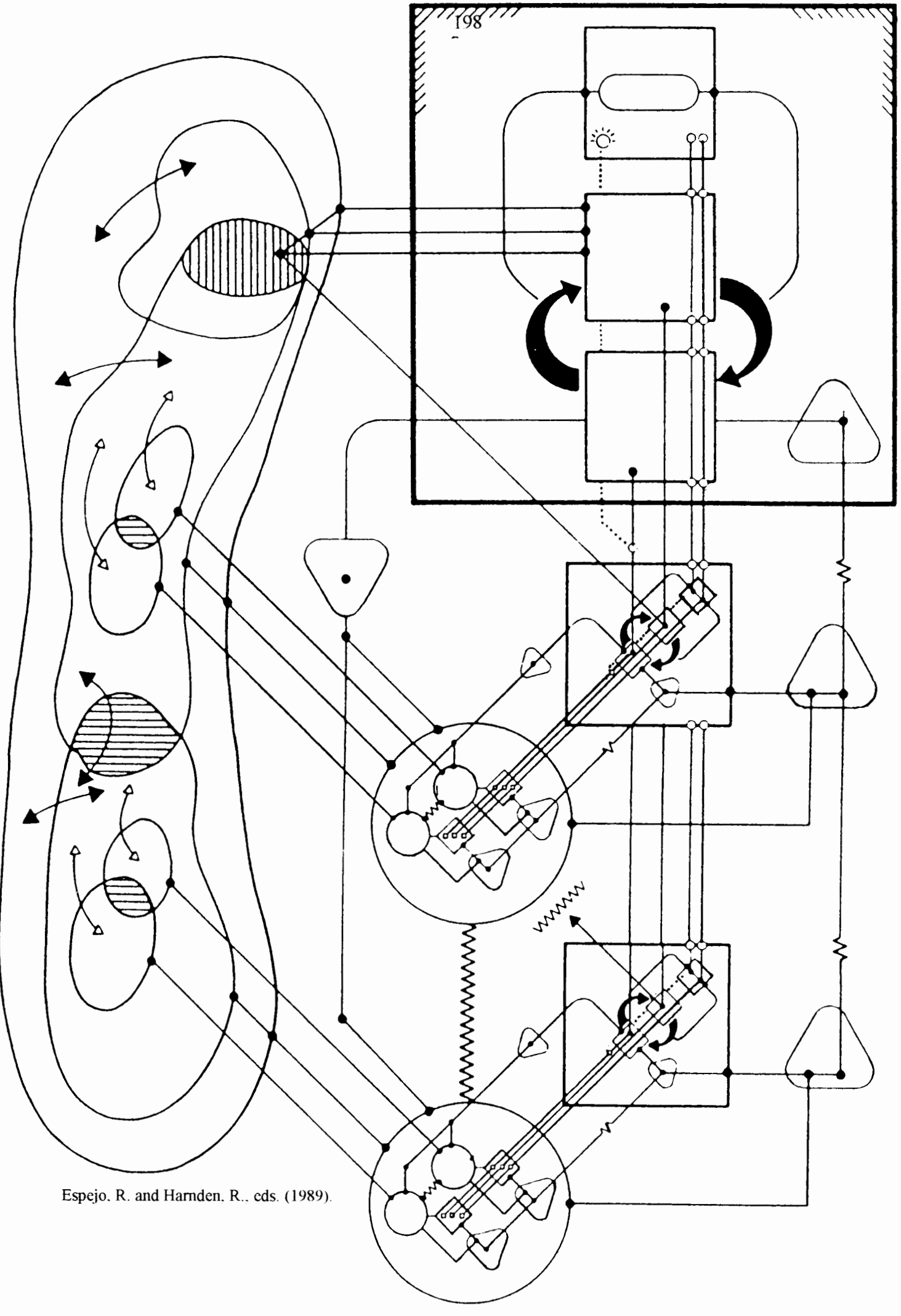
(Traditional) Hierarchy of Rhomberg Bräsler

APPENDIX III

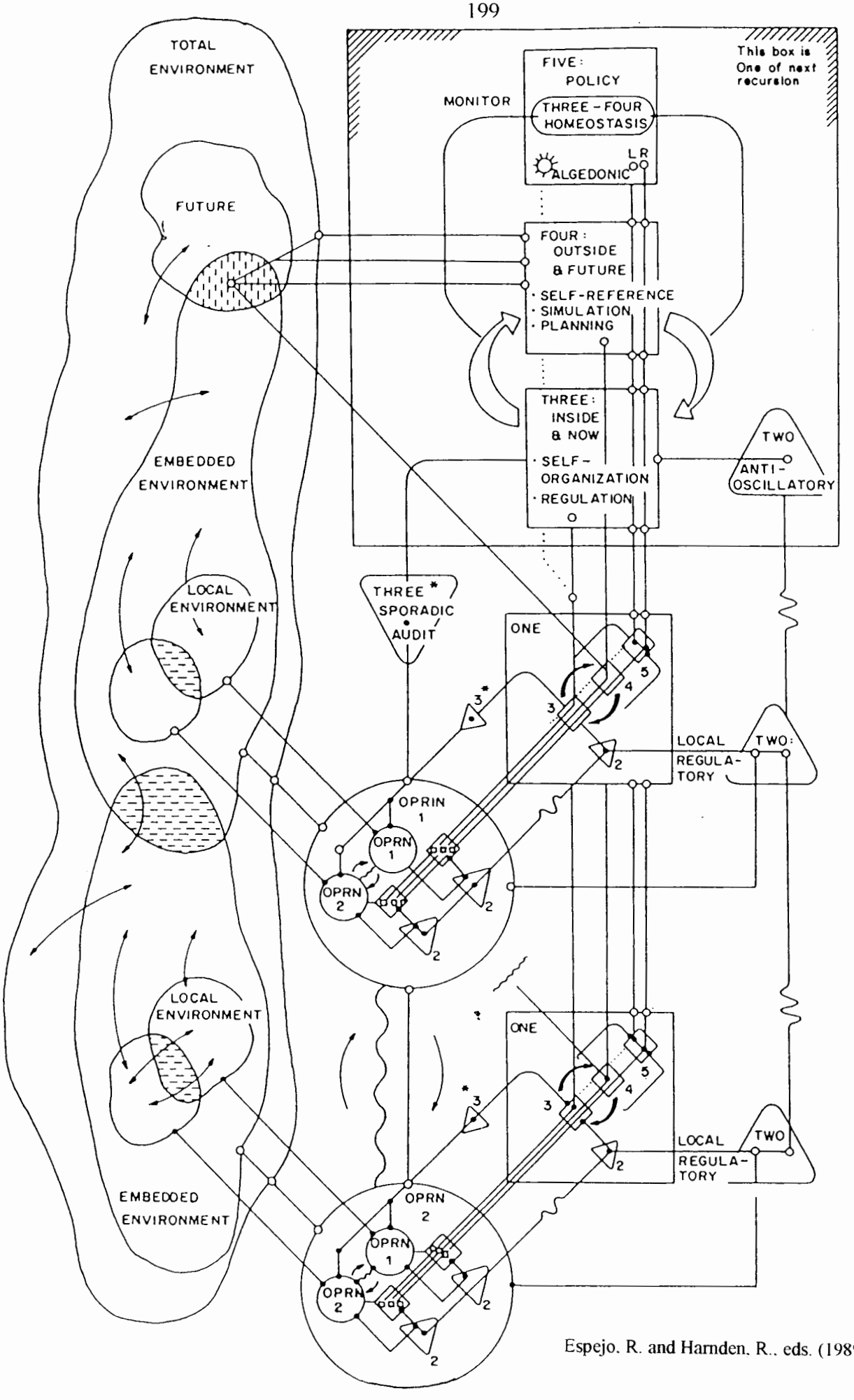
DIAGRAMS OF VIABLE SYSTEM MODELS



Flood, R. L. and Jackson, M. C. (1991).



Espejo, R. and Harnden, R., eds. (1989).



Espejo, R. and Harnden, R., eds. (1989).

APPENDIX IV

QUESTIONS FOR SYSTEMS DESIGN AND ANALYSIS

GROUP A: FUTURE DIRECTED

1.	**Whom should the system serve?**
2.	**What should the purpose be?**
3.1	**What should the measures of performance be?**
3.2	**How will you recognise that the system fulfils its function?**
4.	**Who should the decision makers be?**
5.	**What aspects of reality could be changed by the decision makers?**
6.	**What could not be changed by the decision makers?**
7.	**Who (else) should be involved in this solution process/systems design?**
8.	**What should implementation strategies be?**
9.	**Who might be hurt or be worse off by the system as designed?**
10.	**How will you recognise that the system fulfils its function?**
11.	**Who monitors this?**

GROUP B: PRESENT DIRECTED

12. Who are the beneficiaries under the present system?
13. What are the implicit and explicit functions that the system fulfils for its stakeholders?
14. What are the stated and unstated performance measures and criteria?
15. Who are the decision makers?
16. What aspects of reality do they control?
17. What regulatory mechanisms operate to maintain the system as it is at present?

GROUP C: PROBLEM SITUATION DIRECTED

18. What in your view is the nature, essence or character of the problem?

19.1 What is the history of the problem?

19.2 Which events lead to the perception of the problem?

20. Who are the persons concerned about the problem situation (the problem owners)?

21. Who are the person(s) who commissions (and pays) for the inquiry - the client?

22. In whom is the authority vested to change the system - the decision taker(s)?

23. What are the aspirations or aims of:

(a) the problem owner?

(b) the client, and

(c) the decision taker?

24. What issues are highly valued by:

(a) the problem owner?

(b) the client, and

(c) the decision taker?

25. What are the problem owner's reasons for regarding the situation as problematical?

26. What are the expectations held by the problem owner of this inquiry/problem solving process?

27. Which words (nouns and verbs) crop up most frequently in the description of the situation?

28. What are possible names (labels) for the problem situation?

29. How do you view the problem solving system in terms of people involved, skills required, resources, time available and finances?

30. Do you perceive obvious constraints on the problem solving process/system?

31. How will you know when the problem is solved?

32. Who else should we consult for views on this situation?

Note: Questions in bold print have been asked directly in interview situations more than the ones in regular print.

Source of questions:

Strümpfer, J. P. **Systems Approach Questions for Problematical Situations**, Institute for Futures Research

APPENDIX V

INTERVIEW AND OBSERVATION DATA

Note: The information in this appendix includes most of the interview data (overt and covert), as well as my own observation data. Wherever possible, statements from interviewees have been quoted directly. However, to ensure anonymity and confidentiality, I have not referenced any interviewee when quoting directly. In addition, I have left out any statements made that might incriminate interviewees.

UNION MEMBERSHIP

Everybody thought that when the factory staff joined the union it was a crisis. The company was not where Peter Bräsler thought it was at that time.

Management overreacted when the union came in - it wasn't such a big issue as far as I'm concerned. Management sees this company where everybody is loyal to the company and that everybody works for Rhomberg Bräsler because they like it, because everything is given to them - thus they must be happy.

The union coming in should have happened a long time ago - because these people have never been used to the union - they see Peter Bräsler as a father figure - maybe they don't

trust Peter Bräsler - need someone from the outside to give them advice - I don't have a problem with the union.

It seems that more people join the union just before increase time - they hear from their friends what the union can do for them. Maybe within a year they will see that the union will do nothing for them.

I have in the past had bad experiences with unions - that is what I liked about Rhomberg Bräsler - no union when I joined - However, unions in the Cape are very weak.

One gets the feeling that Peter Bräsler is constantly trying to prove to the factory staff that he is not in any way discriminatory.

However, production line staff are the only people who are really adding value to the company - you have to look after them. They say: "Without us - you're nothing".

I have no faith in the union - unions don't care about production operators.

In today's times we as workers understand more why we belong to unions. Trade unions are there to help workers.

The Staff Representative Forum is pointless. Nothing is achieved and nothing is solved. If management has already made up its mind with respect to a certain issue, it is impossible to change it.

When management gave us a 9.5% annual wage increase last year, we asked for 10% to make it a round figure. I feel they refused the request just to spite us for joining the union.

Peter Bräsler and management cannot understand why we joined the union. The people from the union understand us as workers.

HOUSE MEETINGS / CULTURE CHANGE / ORGANISATIONAL CHANGE

At one of the recent in-house house meetings Peter Bräsler started talking about culture and how the long-term changing of the company culture will improve operations - nobody understands what is meant by culture - don't know what he is talking about. He is unable to effectively explain to them exactly what it is and how the company is trying to change. The production operators thinks that he speaks nonsense. You can ask any of them now what we are trying to do and they won't know. Maslow's triangle, which he presented and explained at one of the numerous house meetings makes no sense to them. He cannot come down to the level of the production operators to communicate effectively. Production operators sit in the back at the house meetings and don't listen to what he is saying. House meetings should rather be on Monday. On Friday afternoons everybody just wants to go home and they are thinking about the weekend. At house meetings production operators lose interest when Peter Bräsler gives presentations. He tries to put things across to the production operators but it does not get across effectively. Production operators lose track of what he is saying. He does not make sense.

It would be better if Peter Bräsler spoke to smaller groups rather than the whole company at house meetings - groups of say five. The quality manager can help. This would be more interactive - would give the production operators an opportunity to respond and comment - discussion. Production operators are afraid to speak up in a house meeting. Therefore smaller groups will be much more effective. Peter Bräsler should discuss and explain culture and where the company is going. He should not throw terms loosely. He must speak less and listen more.

Some production operators have intentions of moving on to other jobs. For many production operators on the production line it is "just a job". There are some production operators who are set in their ways and whose minds one can never change. These type of operators moan at everything and influence the production operators working around them. These type operators have "attitude problems". (However, attitudes can be

changed in the long term. Other operators care about the company's performance and will work hard to make it succeed and will worry if something is wrong. It will be easier to change the minds of the younger production operators. Thus it is a better idea to employ someone young and train them up instead of an experienced person with a fixed mindset.

Peter Bräsler does not take as much interest in what people are doing as he used to.

There is a closed section to Peter Bräsler's mind. We will never know exactly what is going on in his head.

HUMAN RESOURCES DEVELOPMENT / EMPOWERMENT

Peter Bräsler wants to engage in more serious human resources development. I think there has been change in mindset of senior management with respect to management training - Peter Bräsler got a shock with the majority union membership. It was much less of a shock to other people. He thinks something dramatic happened. He realised, in his own words, that the company wasn't where he thought it was. This was perhaps because of the past practice of being paternalistic and benevolent and easy going with respect to wage staff being paid good wage increases.

All these good things that Peter Bräsler thought he was doing was not putting the mindset of the people where he thought they would end up. I am not surprised - wage increases are forget soon after they are given - thereafter becomes the norm. Good salary or wage increases is not a motivator. The fact that operators want to be unionised is still a shock to Peter Bräsler and he still thinks that there is huge problem in company. However, before consultants are brought in and a huge amount of money is spent on them, the size of that problem should be questioned. Peter Bräsler might tell you that people need a

mindset change - not as simple as that - he is very widely read and has cottoned on to recent writings on how to energise people and to get them more motivated. He thinks that the introduction of these principles into company will get people more switched on and in tune, thus resulting in a better company.

By nature people are sceptical. But it is good to have Peter Bräsler looking at possible ways of energising people - if people can be made to feel better about where they are and what they do, it is great. If they can engage their minds and get more out of being here - company will gain more from more production output and suggestions about better ways of doing things.

Peter Bräsler is an excitable person. He latches onto certain things and never stops talking about them, such as human resource development, empowerment and learning organisations. He saw the union issue as a negative thing - although he may not say so in so many words - He now says we should embrace unionism. He doesn't like to be wrong. The fact that staff still wanted to be unionised even after he tried to persuade them not to made him feel that this is something that he had little control over. Maybe he's going ahead with this with more vigour than it deserves.

Another contrasting view: Peter Bräsler knows that things are not as they should be in the company but he is taking far too long to do anything about it.

I have a problem with these meetings that Peter Bräsler had which he called indabas. My definition of indaba is a discussion or problem solving session.

Does Barry ever tell Belinda (Chief test operator) to make her own decisions - does he think she has the confidence or ability to make her own decisions? People should be allowed to make mistakes, to learn and develop. This is one way of empowering employees.

COMPANY'S AIMS AND MONEY SPENDING

Operators don't know what the company is aiming for. They don't know what the new Slimline project and Interkama is all about. There is not enough emphasis on projects, especially on how the project will influence the future of the company.

Production operators are not clear on what money is spent, or why, such as on advertising or new product development.

OPERATORS SHOULD SET THEIR OWN TARGETS - THE PRINTING AREA AS AN EXAMPLE

In the printing area the production operators are hard workers and are not lazy. They are intelligent but they require more training. The Mechanical Engineering Manager has trained them in the past on correct ways of printing but they print according to their own methods. It seems as if they are not willing to learn and they lack discipline. But this may not necessarily be the case.

It should be explained to them that the company is going through a change. The production supervisor should not tell them what to do.

The printing girls mustn't be trained on the line during production - they are pressured by the supervisor during production hours. There are many settings on the printing machine to be changed very often and the supervisor tells them what to do at any time of the day. The supervisor should tell them what she wants for the day and let the operators decide how they will do it - they know the process best - let them plan their day. The supervisor keeps on chopping and changing - She should know what target is for day. The operators don't like just to be told what to do. The printing department should be separate - like a small company. Leave decisions to the operators on how to meet production target - i.e.

whatever order they think is easiest - will improve job motivation as long as the operators agree on what the target is they will achieve it.

The production operators are too dependent on their supervisor - production operators want to be like their own boss - "I know what I must do - I don't need to be told what to do".
Production jobs are generally boring so maybe production operators want to plan what they will do to make it more interesting.

All production operators should have a target.

JOB SATISFACTION

How do we change perceptions of what people have about their jobs - have spoken to outside people (from other assembly lines) - basically assembly line jobs are monotonous and boring - only way to make people do monotonous jobs is to give them some benefit that they otherwise won't have and that is why we pay them to do their jobs. Can't change their job - but try and reduce monotony by automating some functions. Setting targets is like having a monotonous job with a target.

Motivating people - if one can't motivate them by changing their job - then by fulfilling some other need in them - must need to feel important - to be seen as important member - perhaps involve people in decision making that affect them - to what extent - I haven't explored - let them have a say in something - let them decide work targets - how to change something that will make them feel better - ask opinions on things - for example layout of shopfloor or ways of eliminating non-value added activities. As opposed to be an old style manager and just doing it because you think it is a good idea - ask people their own opinion - will feel more needed and important.

I have not explored this very far - time pressures - always running after something.

"BLUE SKIES" QUALITY CIRCLES

Blue skies is not really working - but the Quality manager will tell you otherwise. Blue skies should be voluntary - production operators who don't want to be there distract production operators who want to solve problems. Production operators mess around in blue skies - they just pretend they are having constructive discussions when the Quality manager comes to observe the blue skies meetings. Production operators who do not want to join in should just carry on with their work.

PRODUCTION MANAGEMENT

The Production manager (Wolfgang Marnitz) should be full time on production line. There is not enough drive from him. In the old days the production manager would sort out problems straight away.

The Quality manager has sort of taken over the production management role. But he just wants to sort out problems quickly.

Credit to the production manager - The stores are more efficient than they used to be.

The production manager should try and make production operators more concerned about what they are doing - explain consequences. Some operators work hard and are willing to learn. He should make the operators understand that they are doing the job for themselves.

When I have a problem I would rather go to Mr Bidder rather than to the Production Manager.

Wolfgang Marnitz relies on Judy (Supervisor) too much. He always goes to her with problems or for advice. He has more confidence in Judy's decisions than in the other supervisors.

It disturbs me that their is a lack of production management. Wolfgang is completely overloaded - he can't handle purchasing, stores, MRP and production - he relies on Judy to run the production line.

We are working overtime too much.

Wolfgang Marnitz spends too much time behind his computer terminal. The production manager should come on to the production floor in the morning and also during the day when there are problems. He should have a better idea of what is going on the production line.

Gerald Bidder is a good production manager - he will always sort out problems on the line. Wolfgang Marnitz must get more involved on the line - The purchasing function should be taken off his hands so that he can perform his production management duties.

Wolfgang Marnitz has got a very abrupt attitude towards production operators. He says what he thinks and just expects. He is very argumentative. Gerald Bidder is better on the production line.

The production manager has to deal with a whole lot of phone calls during the day - takes up more time than expected.

Working on the shopfloor with different people - wide range of intelligence on the line. Same things get asked year in and year out. People sometimes pick up things that you

never think they will pick up. People are so suspicious of what other people are doing. Assume that people are doing things that they shouldn't.

What you say and what is intended are sometimes not the same. Thus difficult to work with people.

Shop floor suspicious of management.

Management is not a hard science or job - not hard and fast rules - unlike operator - doing very defined job - managing is difficult - management skills are not easily obtained - most managers have not been trained - a lot is learned due to experience - cannot learn how to deal with people because people are all different - people react differently when they are in a group than when on their own.

On a one-to-one basis people do not want to speak up to air problems. The only way to learn as a manager is to do and make mistakes - unfortunate that mistakes have to be carried with you which people don't easily forget. To work with people is difficult - not seen to be difficult by non-managers - managers often do things in a haphazard fashion without logical sequence.

Production operators sometimes do not confront me directly when there are problems. They would rather go straight to Mr Bidder to complain about certain issues.

Production manager would like it if he could spend more time planning production.

DECISION MAKING

The chief testing operator (Belinda Jacobs) should be able to make more decisions herself - not come to ask for approval if 99% of the time she is right anyway. She has got the

experience - feeling if something is wrong or right. Production operators need to make more decisions themselves - will change their attitudes.

Production operators are still not thinking for themselves - not improving their own system within which they work - still relying on supervisor to sort out their problems.

Production operators should make more of their own decisions. When a supervisor is off work for some reason, the production operators under her supervision are afraid to make any decisions for fear of making a mistake. In Blue skies I try to tell production operators not to worry about making mistakes. If I phone the test operator when off sick, she does well to meet the schedule for the day.

Production operators are not confident to take up the initiative to run production.

My decision as a worker doesn't count on the line. Mr Bidder argued recently with me regarding how to do a certain job. I recommended the right way how to do it and he insisted that his way was right. He was proved wrong in the end.

Management should leave decisions up to ourselves to make and not make decisions that they think are in our own interests.

FLEXI-TIME

Flexible time should be introduced - one should be able to work from 7.30 to 4.00 or from 8.30 to 5.00 - it would not seriously affect anyone and would lead to better motivation. The printing section, for instance, could easily have flexitime - if they have a schedule they can go home if they put their hours in and the target is met. This will also not affect anyone else. However, not everybody can do flexitime - The production manager must be available during core hours since he deals with the production line as well as with suppliers.

SUGGESTION SYSTEM

Maybe we should start with a reward system, for example 0.5 hr off on Friday or R20 for a good suggestion put forward. The Toyota suggestion system will not work unless rewards are presented for the best suggestion. Production operators have the best answers - they are not stupid - problem is getting them to make suggestions.

DISCIPLINE / TIDINESS OF PRODUCTION LINE

The production line is a mess - components just lie around - production operators should request boxes at blue skies to put things in. Maybe put components in racks. There should be a place for everything on the line. Every tool and piece of equipment should have a home.

Production line should be neat and tidy - everything should have its place. But does it have to be like that - if you are more organised you will perform better - perhaps a personal trait of some people. mess on the line comes from the way things have been done on the line over the years - no strict control of components or strict kitting up for jobs and always been free issue from stores and hard to break that habit without being rigid about it. There is no strict checks or controls on materials issued for a job that they get used for that job and that they get used up immediately.

PRODUCTION OPERATORS / RELATIONSHIP WITH MANAGEMENT

Production operators are spoilt. They get everything they want and they don't want to give back to the company in return. They have no respect for management.

Some people always moan, no matter if there is something to moan about or not and like to find faults with other people.

There are certain operators who sometimes don't do any work. Targets should be set for the operators.

There are too many lazy operators. But you can't do anything about it - they'll just call in the unions.

Supervisors sometimes disregard operators not pulling their weight.

Some operators were quiet when they started working here but have become troublemakers.

Some operators do not take an nonsense from anybody. They have minds of their own - don't let anybody influence them - although they are union members.

It is not a good thing having family members working together at the company.

Management is too soft with the production operators. Many of them should have been out of the company by now. They stay off sick when they feel like it. They never get any warnings for anything.

Management doesn't listen to me - I have complained to management about certain operators not working but they have done nothing about it.

Production operators believe that the company is loyal - nobody has been retrenched.

There are certain stars on the production line.

SUPERVISORY MANAGEMENT

It is difficult being a supervisor. It is difficult managing the operators. They gang up against the supervisors sometimes and don't listen to them. There is a lack of discipline.

Judy (Slimline supervisor - most responsibilities) is regarded highly by the other supervisors. She takes in things easily, understands things.

I sometimes have difficulties in grasping things and learning.

It is difficult making decisions.

I don't like confrontation with the operators.

All supervisors at any company cover for people not pulling their wait.

Judy Baron will stay here until she dies - to Judy Rhomberg Bräsler is the world - other supervisors are very much under Judy's influence.

The problem is that the supervisors are operators working. Supervisors should train operators and make sure that they are fully loaded.

A good supervisor must believe in herself to do any job that any of the production operators under her supervision do.

It is better to hire someone young and inexperienced on the line because they learn better.

Production operators generally have the correct instruments or tools to do the jobs that they do.

I tried graphs with production operators but it didn't work. They saw it as trying to get more work out of them even though it was just to determine their level of performance. Production operators don't accept change. There are also instigators who influence other production operators.

When I tell my operators what to do or how to do something, they acknowledge but then do something different. If production operators are approached nicely things don't get done. It is necessary, as a supervisor, to be aggressive with production operators. Production operators then respect you.

Gerald Bidder categorises production operators and treats some like they're stupid. Without supervisors the shop floor would be chaos. Gerald Bidder has on occasion had discussion with operators about supervisors. I wanted one of the operators moved to my line and discussed it with Gerald Bidder. He agreed but changed his mind after being influenced by that operator.

Production operators have no respect for Judy but she is a genuine hardworking person.

Judy is very well organised. At the moment she is very piled up with work - she is overworked and might crack. I had to transfer some of my production operators to the Slimline line to help Judy out over the recent demand for more production.

COMMUNICATION / MORALE / QUALITY

On the production line - the morale is very high - communication is better - the quality is better - where we fall down completely is the hand-over from NPD to the production line - maybe because we have so many different products - products are not properly industrialised. - especially 'quick step' products. Some units we are only making from a sample - there is no documentation. Operators make old products from samples and not

from assembly plans - problems not with major products - it's modified units, BX003, units taken from standard to Slimline directly without FMEA - and promises made to the customer.

Production operators question to NPD: "Why develop new products when existing ones have problems that need sorting out?".

When Countaline went to the line the operators didn't know how to package it or where the prints should be on the housing. With Thermoline the production transfer was done properly with the engineer training the production technician.

Over the years I feel communication with management has improved as well as the work environment. To me Rhomberg Bräsler feels like a home.

When Mr Rhomberg left the company communication became better. He wasn't a very approachable person.

People don't open up - especially on the production line. There is a lack of communication - Production operators don't have faith or trust in management.

If production operators have problems regarding work or personal matters, they would rather discuss it with fellow workers than go to management. However, problems generally filter via the grapevine to management. Production operators feel that management has a very negative attitude - they already assume beforehand that the answer will be "no".

In the old days communication with management was better because the company was smaller.

TRAINING / NEW PRODUCTION OPERATORS

I'd rather train up production operators from scratch rather than get in new experienced production operators.

We should get more men in the company especially on the production line. Men are easier to manage. They can do the job better. They can also do delicate work.

People should be better trained - shown the best possible way of doing something assuming someone knows the best possible way. People should perhaps train themselves - let people develop the best possible way. We should as management look at people - ask them - what is the best way - change mindset of management - lot of literature on production efficiency - can implement and monitor change. I am under no illusion- there are vast improvements that can be made.

EMPLOYEE INVOLVEMENT

Management didn't involve people in the move from the old factory to the new factory - they didn't ask them what they want in the new factory - Management decided in the boardroom what people will like without consulting them. The production operators will tell you: "We didn't ask for carpets and plants" - Peter Bräsler sees this as a perk to them.

TECHNICIANS / SALARIES / RESIGNATION

Technicians will agree that this is a nice place to work. However, they know they will earn more money for less work elsewhere.

I would never threaten my boss to give me more money to stay - If he offers me more money when threatened I'll leave because he knows that he was exploiting me.

Technicians see what their friends are earning out there and they know how underpaid they are.

Some technicians are ambitious.

Technicians in general are paid very low.

Technicians should only work overtime if the shopfloor requests it.

PRODUCT CHANGES / COST MONITORING

Engineers generally hate to make changes - do not do all the necessary change procedures properly.

Here changes cost a lot but these costs are not monitored.

PERFORMANCE INCENTIVE SCHEME

Performance remuneration is very difficult to implement.

You need somebody full-time to monitor performance and the fairness of it all - it must be very fair and simple so that the production operators can work out their own bonuses.

Bonuses could be group or individual based - we then need an industrial engineer - time study expert. Bonus system is nice but it has to be controlled and monitored.

It needs somebody independent to monitor it.

I agree on group bonus - production operators would be so dependent on their bonus that esp in a group - they watch each other that they all pull their weight.

Production operators who work on sensors - target is set for the week. Production operators should be rewarded for their hard work - even a thank you would do. Production operators should be appreciated for their work.

MANAGEMENT / MANAGEMENT TRUST

In this company a lot of time is wasted by managers doing basic admin work - Peter Bräsler says in this company we want hands on management.

Management has more faith in Judy (i.e. the supervisor of the Slimline line, the first supervisor in the company) than the other two supervisors. Gerald Bidder will always want to discuss a matter with Judy before making a decision on the production line. He does not consult the other supervisors. However, most of the time, Judy makes the right decisions.

Gerald Bidder has trust in me to do my job properly. He should have more trust in other production operators.

Management is not effective. However they probably do their own jobs okay and work for the good of the company. Things often don't get sorted out.

On occasions I have confronted Mr Bidder on certain issues and his response was that he doesn't have to account to me.

Staff relationship with management has its ups and downs.

My relationship with Rob Businger (Mechanical Engineering Manager) is good but it is very difficult for most production operators to get on with him because he is not very approachable. However, he is good, honest and hardworking person.

Rob's enthusiasm has dropped. Fault of management.

The Quality manager does not try and get people involved. He is not at all aggressive - laid back - needs to pull things through - needs to really talk to people - does not give the impression that he is working hard. He can do much more in the company. He needs to speak to the production operators, more about what quality means and this must take place in small groups.

He sometimes does not inform people when he makes a change on the line.

New cliché's are made all the time for the printing area. Willie usually organises this but he doesn't inform production operators when changes are made. He also doesn't follow things up.

PRODUCTION SYSTEM / IMPROVEMENTS

One should do pilot study - change one section of the line and monitor change. We are a company without excess staff members - problem is that you don't have time to take yourself or pilot study group with you and let them not be as productive as they normally are. My perception - ability to produce is very close to the order intake that we have.

Wolfgang Marnitz would like to spend a lot more time on the production line spending time improving systems. However, the purchasing function needs to be taken off his hands in order to have more time.

A better system - production planning - purchasing, staffing, production efficiencies. Planning and scheduling could be better. Shopfloor efficiency can definitely be improved.

The production manager does a lot of very basic clerical and admin work such as checking incoming orders, which should be changed.

Problems lie with the lack of development of the system. Not people blocking system. We should as a production unit be more professional than we are - we must have better information system. Computer system is under-utilised - an outside consultant would save time in improving the computer system.

Perhaps been policy in the past to do every thing ourselves - philosophy of the company has changed recently - lot of training taken place recently- more with respect to management.

Management has been on a Production and Operations Management course recently as well as Mr Bidder going on a World Class Manufacturing course given by Schonberger himself.

I often walk around the shopfloor after people have left and think of ideas (that I never get during the day when people are there). Walk around without specific objective - latch onto things - explore thoughts without interruptions - jot down and sometimes take action - to be able to be here but not being pressurised about things - would come up with ideas of improvement.

The company over the years has changed for the better. Things on the production line are done better.

Some production operators just moan a lot - it is in their nature.

KANBAN / WCM

Variability of product makes a kanban system difficult. It assumes that the planning is such that you can have one person place 5 components and the down stream operation is just finished doing something and then ready to receive the 5 components - making assumptions about timing in an environment where there is a great variety of products. The operations are similar but the products are different - timing issue is difficult.

WCM - schedule by rate and not by lots - but depends on what you are making.

AFFIRMATIVE ACTION

Affirmative action should be implemented in this company.

It is difficult to admit that RB does not have any affirmative action plans. This could lead to other companies boycotting our company because we employ no blacks. However, we shouldn't be pressurised from the outside.

Should we get blacks in this company we will really know where we stand. Lots of people feel that there should be blacks in this company.

There are plenty black managers out there who have has the training but the job opportunities have not been available to them in the past.

PROMOTION ON THE PRODUCTION LINE

It is difficult to get promoted on the production line. I have asked Mr Bidder to promote me since after being at the company for 5 years. He said that he needed me in my job because I am the best person to do it, even though I assured him that I could train up somebody to do the job just as well.

PROBLEMS - GENERAL

Problems don't necessarily lie with shopfloor operators - maybe admin staff as well.

There is no absolute truth - there is only what you see. Talk about problems - very difficult to pinpoint problems - a problem is someone's perception. But to ask me what are the problems - you need to give me directions.

People do rub others up the wrong way - lot of tensions in company - across the board - management and staff- within departments - sometimes valid.

It would be very interesting to tell people exactly what you think but cannot do unless you are leaving company - would hurt relationships but at least a lot will be revealed.

There is no policy with respect to employee perks.

Every company should have a personnel manager.

Other companies have loan schemes for their employees at a favourable rate of interest. The company would not lose out.

The different ratings between workers should be scrapped.

The production output has not increased at the same rate as the growth of the company - not the production operator's fault - system's fault. Difficult to say.

THE COMPANY IN THE FUTURE

The system should serve its production operators - without production operators the system is nothing.

The system fulfils its function when there are no component shortages and no absenteeism. There are no production operators taking unnecessary leave when they know there is work to be done.

The system should serve everybody.

The purpose of the system should be that it remains profitable and that everybody should benefit as a result.

A measure of performance that is not taken: measurement of the time taken from when the order is received from the customer to when the product is packaged, ready to be shipped to the customer. A target should be set for this. The system is fulfilling its function when the company is profitable and expanding. Any changes made in the company in the future must be thoroughly explained to the production operators, how it will benefit them, since any new systems implemented will be something new for them and production operators generally resist change.

APPENDIX VI

RHOMBERG BRÄSLER: STATEMENT OF COMPANY PRINCIPLES AND OBJECTIVES

Note: The Rhomberg Bräsler Statement of Principles and Objectives was compiled from contributions made by members of staff in response to the question:
"What does it mean to you for us to be the best company?"

KEY POINT SUMMARY

- To be recognised as a **QUALITY COMPANY**;
- To be truly **CUSTOMER DRIVEN**;
- To **COMMUNICATE** well throughout the company;
- To increase **PROFITS** so that our company can grow, remain healthy and secure and enable everyone to share in its success.

OUR CUSTOMERS

- To always put the customer first in all company actions and to attend to his problems as a first priority. To always endeavour to remain close to our customers in order to understand his needs and service his problems.

- To treat our customers with utmost respects and friendliness.

- To offer our customer products of uncompromising quality, reliability and value in order to earn his support and loyalty.

- To treat our distributors as business partners offering them excellent sales and technical services and good product knowledge.

OUR PRODUCTS

- To be recognised by our customers and our employees as a quality company. To be driven by an uncompromising and consistent commitment towards quality in our products and services.

- To encourage new ideas for new and better products.

- To develop new and better products to meet the exacting needs of our customers.

- To consistently seek ways of improving our manufacturing methods, productivity and capacity in order to reduce the unit cost of our products and to remain price competitive.

- To encourage our people to develop their know-how and the company's technology in order that our products meet our company's needs and exacting demands in design, manufacture and performance.

- To remain abreast of developments in our field and to respond timeously to changing trends in the marketplace, i.e. technology and customer needs.

OUR MARKETS

- To increase our penetration of existing markets by being better than our competitors, i.e. to differentiate ourselves through:

  - better product quality and performance;
  - better product features and benefits;
  - better price and value for money;
  - better availability and distribution;
  - better technical support and after sales service;
  - better product literature and promotional activities.

- To aggressively pursue and capture large accounts in key industries to increase market penetration.

- To establish geographically new markets for our products, thus becoming a world player in industrial automation markets.

OUR PEOPLE

- To foster a good spirit of co-operation, goodwill and trust amongst all our staff.

- To look after our people and to provide them with a secure and stable base of employment and to ensure their health and safety at all times.

- To pay the best wages and salaries we can afford in order that all Rhomberg Bräsler employees can achieve good living standards.

- To provide equal opportunity for jobs and advancement regardless of race, colour, religion or sex. To recognise individual achievements and performance and to give everyone the opportunity to improve his/her skills and capabilities. To promote our people from within our company wherever possible.

- To enable all our people to share in our company's success and its ownership.

OUR MANAGEMENT

- To conduct all company affairs with utmost honesty and integrity, adhering to highest moral standards. To treat our people fairly, respecting the dignity of the individual.

- To provide dynamic leadership, which generates enthusiasm at all levels. To provide a clear vision and realistic goals, which inspire and direct everyone's activities and spurs the development of our company.

- To encourage an easy and open flow of communication at all levels of staff. To have and open, flexible and participative style of management which encourages

everyone to contribute ideas and voice opinions in the interest of our company's development and growth.

- To encourage initiative and innovation amongst all members of staff.

- To promote and maintain high levels of discipline in all functional areas of our company in order to operate as an efficient organisation.

OUR COMMUNITY

- To contribute to the well being, upliftment and development of the society in which we operate our business.

OUR PROFITS

To achieve high and sustainable levels of profits for our company:

- to meet the responsibilities and expectations of our employees, customers, shareholders , capital providers, suppliers and community as a whole;

- to meet the demand for increased financing of our company's expenses, stocks and debtors resulting from inflation and company growth;

- to meet everyone's expectation of a stable and secure source of employment and income.

Finally, to make our employees, customers and shareholders proud to be part of our company.

APPENDIX VII

SSM: STAGE 5
COMPARISON OF EACH CONCEPTUAL MODEL WITH CURRENT PERCEPTIONS OF THE PROBLEM SITUATION AT RHOMBERG BRÄSLER

As previously explained in chapter 11, a table has been constructed for each conceptual model in the format as shown below:

Comparison of Conceptual Model 'x' with the problem situation at Rhomberg Bräsler				
System activity	**Does activity take place in real situation? If so, how is it performed?**		**By what criteria is it judged, if any? / Measure of performance?**	**Comments / Ideas for change? / Recommendations / How?**
Activity 1				
Activity 2				
Activity 'y'				
Links:	1-2, 2/3-4, etc.			

Note again that the tables show the answers of the questions relevant to each activity as well as indicating the links between the activities. In the table above, activity 1 immediately precedes activity 2, whereas both activity 2 and 3 immediately precede activity 4.

Comparison of Conceptual Model 1 with the problem situation at Rhomberg Bräsler				
System activity	**Does the activity take place in the real situation? If so, how is it performed?**		**By what criteria is the activity judged, if any? / Measure of performance?**	**Comments / Ideas for change? / Recommendations / How?**
Activity 1: Identify/clarify distributor and customer needs and demand - marketing function - NPD function	Yes	Competitor product surveys Market surveys. Experience obtained on overseas travel. Identification based on past experience. Performed on an ad hoc basis.	-	Direct contact with customers and distributors on a more regular basis. Create a closer relationship with RBM, RBE and its customers. Obtain more information on competitor products and applications.
Activity 2: Appreciate company business and technology	Yes	Annual Business planning Maintaining awareness of current manufacturing and service technology.	-	-
Activity 3: Find out how to meet these needs	Yes	Production planning and scheduling. Design manufacturing of products, so that products can be manufactured within expected lead times.	Rough measurement - assessing customers dis-satisfaction when receiv -ing a low quality product or not within lead time.	-
Activity 4: Design marketing strategy	Yes	Performed by executive management in conjunction with RBE MD & sales engineers. Also at Sales Counselling workshops	Recent measure: Survey of opinions from employees who attended workshops.	More input required from customers and distributors. More intensive market and competitor studies.
Activity 5: Design products - NPD	Yes	NPD designs new products and performs maintenance and modifications on existing products in teams to offer products that the market requires.	No measures in terms of project completion time. Rough measurement - Does product work well? Does product perform well in the field?	Restructuring of design methods. A re-look at how the department functions. Learning new technology. Institution of a departmental development team. Incentive scheme.
Activity 6: Obtain resources: - sales service - technical backup - training - components - skilled labour	Yes	RBE sales engineers and clerks selling and servicing products backed up by TSD and NPD. Operators are trained on the production line or are employed with skills. Components are purchased or manufactured in-house.	Only quality components purchased. Service measurement is only in terms of compliance with ISO9002.	More time should be spent on obtaining more cost-effective resources. Need for more training / training courses.
Activity 7: - Organise resources	Yes	Production manager, quality manager and supervisors organise resources	-	Development of production methods - research, experimentation and measurement/assessment.
Activity 8: - Manufacture products - Sell products Provide backup	Yes	Production line manufactures. RBE and Export dept. sell. RBE, NPD and TSD provide backup.	Rate of product manufacture. Rate of product sales.	Production time per product can be reduced by looking at work methods and production line re-structuring - also by people development
Links:	1/2-3, 3-4/5, 4/5-6, 6-7, 7-8.			

Comparison of Conceptual Model 2 with the problem situation at Rhomberg Bräsler				
System activity	**Does the activity take place in the real situation? If so, how is it performed?**		**By what criteria is the activity judged, if any? / Measure of performance?**	**Comments / Ideas for change? / Recommendations / How?**
Activity 1: Appreciate staff income needs	Yes	Management's appreciation that staff's main reason for working is to generate an income.	-	Communicate more frequently, or on a more formal basis, with staff regarding individual income needs and career aspirations
Activity 2: Find out about competitive payment rates	Yes	Management finds out what other companies in the industry pay their employees. Operators are classified according to Industrial Council grades.	Wages are compared to Industrial Council grades. Otherwise, performed on an ad hoc basis.	More formal analysis of competitive rates could be performed. Institute formal salary or wage structures.
Activity 3: Define staff expectations	Yes	Discussed by management	-	Consult with staff more
Activity 4: Negotiate wage structures/ annual increases with staff	No	Wage structure decided primarily by management but can be discusses with staff members. Annual increases are paid in accordance with percentage laid down by SEIFSA (Steel and Engineering Industries Federation of South Africa).	Wage structures are compared with the industry. Annual increases comply with SEIFSA rates.	Rhomberg Bräsler wage rates are high compared to other companies in the same industry in similar areas.
Activity 5: Decide on wage structures/ annual increases	Yes	Management decide on wage structures of employees. Similar annual increases are generally given across the board.	-	Implementation of an incentive scheme.
Activity 6: Clarify union/ industry requirements - wage structures - working hrs - conditions of work	Yes	Working hours are within industry regulations. Wage structures are above industry standards. Conditions of work are exceptional.	Industrial Council Handbook is consulted on a "needs-be" basis.	-
Activity 7: Comply with industry/ union requirements	Yes	By always keeping up-to-date with industry requirements. Negotiation with union	-	-
Activity 8: Pay staff	Yes	Wage staff - weekly cash payment Salaried staff - monthly by bank transfer	-	-
Links:	1/2-3, 3-4, 4-5, 5-8, 6-7, 7-8.			

Comparison of Conceptual Model 3 with the problem situation at Rhomberg Bräsler				
System activity	**Does the activity take place in the real situation? If so, how is it performed?**		**By what criteria is the activity judged, if any? / Measure of performance?**	**Comments / Ideas for change? / Recommendations / How?**
Activity 1: Appreciate and adhere to the company statement of principles and objectives	Management does to the best of its ability and within reasonable constraints endeavour to conduct its business within the principles and objectives of the organisation.		Principles and objectives are read out at many company meetings and gatherings and staff are asked to comment on or discuss issues relating to the contents of the statement.	Update Statement of Principles and Objectives, as required. Always question and ensure compliance with Statement.
Activity 2: Discuss issues to which policies need to be formulated	Yes	But only performed on an ad hoc basis. When the need arises, usually from proposals from staff, or from management having difficulties in deciding certain issues.	-	More disciplined approach at formulating policies - ad hoc basis wastes energy and time - especially people discussing various issues during work hours
Activity 3: Decide on issues to be formulated	Yes	But only when the express need arises. Managers can formulate policies for his/her own department	-	Policies should be adhered to company-wide to ensure fairness and minimal confusion.
Activity 4: Consult staff to obtain involvement on policy formulation	Yes	Via the Staff Representative Forum (SRF) and Workgroup (SRW)	-	-
Activity 5: Create and develop and formulate policies	Yes	By management, in conjunction with proposals made by staff via the SRF and SRW	-	Set up project team to formulate policies - management in conjunction with certain representative staff members
Activity 6: Discuss and plan how to put policies into effect	Yes	In weekly management meetings	-	-
Activity 7: Put policies into effect	Yes	When the need arises	-	More policies or guidelines should be instituted.
Activity 8: Inform staff of requirements for adhering to policies	Yes	Via departmental managers or via notices placed on noticeboards around the factory building	-	Could be explained via short regular meetings with staff and management. Introduction of staff handbook.
Links:	1-4, 2-3, 3-4, 4-5, 5-6, 6-7, 7-8			

Comparison of Conceptual Model 4 with the problem situation at Rhomberg Bräsler				
System activity	**Does the activity take place in the real situation? If so, how is it performed?**		**By what criteria is the activity judged, if any? / Measure of performance?**	**Comments / Ideas for change? / Recommendations / How?**
Activity 1: Appreciate needs of unemployed people or people working for another company	No	If performed, it is generally via word of mouth. It is not necessary to look for potential staff - there is a waiting list of people who would like to work for Rhomberg Bräsler	-	Management's perception is that it is better not to employ family members of current employees.
Activity 2: Appreciate needs of Rhomberg Bräsler production line	Yes	Only performed by production management as the scope of products to be manufactured, changes	-	Constant production line development should take place - not only in crises.
Activity 3: Appreciate needs of existing Rhomberg Bräsler employees and management	Yes	On an informal basis - if and when the need arises	-	Should be done on a more formal or regular basis - management should actually take the time to assess each individual staff member - not to take them for granted
Activity 4: Identify jobs that could be available at Rhomberg Bräsler	No	-	-	-
Activity 5: Decide on job positions that need to be filled	Yes	Only performed when need arises	-	-
Activity 6: Find, employ and train new employees	Yes	Usually via employees on the production line, or advertising - then interviews and employment Training only performed when necessary for job	-	Institute orientation course for new employees and a companywide training course - explanation of product ranges and applications. Compile staff handbook. Institute manual of operations for each job to be performed. Revive 'ILUX' - i.e. present ineffective Rhomberg Bräsler employee grading scheme.
Links:	1/2/3-4, 4-5, 5-6			

Comparison of Conceptual Model 5 with the problem situation at Rhomberg Bräsler				
System activity	**Does the activity take place in the real situation? If so, how is it performed?**		**By what criteria is the activity judged, if any? / Measure of performance?**	**Comments / Ideas for change? / Recommendations / How?**
Activity 1: Appreciate operational, manufacturing & quality processes and programs	Yes	Most employees are/or should be aware of and should appreciate all processes and programs.	No measures, but some employees might not appreciate certain processes and programs.	More training and/or awareness programs.
Activity 2: Identify, appreciate & clarify professional services offered by Rhomberg Bräsler	Yes	RBE/ QA, NPD function: - customer support - special investigations - applications consulting	-	-
Activity 3: Decide on how to organise the production line, its services & its people in an impressive way	Yes	Performed by the MD of RBM and his production manager, under the influence of the chairman of RBM	-	More involvement of staff in the process - explain necessity of good organisation - need to change culture in the long term.
Activity 4: 1. Lay out the production line in an organised way. 2. Institute organised processes. 3. Keep the line tidy. 4. Organise people. 5. Organise resources.	The production line is in the process of being restructured into cells to improve structure and facilitate processes. The production line is untidy and there is no discipline in this regard - affects impressiveness. At the end of each day there is a 'clean-up' time allocated to shop-floor workers for tidying up the production line.		-	Every tool and jig on the production line should have its own place and should be stored in these places when not in use. A tidy place of work gives on the impression and feeling of an organised and efficient operation. 'Clean-up' time should not be necessary if the line is maintained during the course of the normal production day.
Activity 5: Promote the production line & its processes and services to existing & potential customers. - advertising - catalogues - factory tours	Yes	Customers are often shown around the production line to impress them with the technology that is being used to manufacture the products. Production methods and quality assurance are advertised in catalogues, magazines and the company's promotion videos.	-	Extend more personal invitations to the factory to key customers and overseas distributors.
Links:	1/2-3, 3-4, 4-5.			

Comparison of Conceptual Model 6 with the problem situation at Rhomberg Bräsler				
System activity	**Does the activity take place in the real situation? If so, how is it performed?**		**By what criteria is the activity judged, if any? / Measure of performance?**	**Comments / Ideas for change? / Recommendations / How?**
Activity 1: Find out and understand manufacturing processes	Yes	Documented briefly in the quality manual.	SABS audits	More user friendly document or training course explaining very simply (perhaps graphically) the production process as well as detailed descriptions of all production line activities/tasks. Send more people on training courses, eg. WCM.
Activity 2: Find out and understand RB policies and procedures		Documented in the quality manual - However, not many formal policies		
Activity 3: Discuss and negotiate performance criteria in terms of: - efficiency - effectiveness	No	Not performed in any serious way. Operators do not have any targets to meet. there is no way of gauging operator productivity on a day to day basis.	Only daily overall production figures are calculated and displayed on the production line - Operators are not given any rewards since there are no real targets to be met. However, in recently created work cells, productivity charts are compiled. Productivity = output/people - should remain fairly constant (assuming productivity is constant) regardless of absenteeism.	Improve overall manufacturing techniques. Train production line. Get people involved.
Activity 4: Set performance levels	No			
Activity 5: Decide on what information is needed	No	Only pilot studies have been performed.		
Activity 6: Gather relevant information from people and processes	No	Only pilot studies have been performed.		
Activity 7: Compare	No			
Activity 8: Feed back information to employees	No			
Activity 9: Reward employees via incentive scheme, if applicable	No			Need to implement some sort of incentive scheme. However, all processes and procedures need to be accurately documented.
Activity 10: Check if policies and procedures are being carried out efficiently and effectively	No			
Links:	1/2-3, 3-4, 4-5/7, 5-6, 6-7, 7-8/9/10			

Comparison of Conceptual Model 7 with the problem situation at Rhomberg Bräsler				
System activity	**Does the activity take place in the real situation? If so, how is it performed?**		**By what criteria is the activity judged, if any? / Measure of performance?**	**Comments / Ideas for change? / Recommendations / How?**
Activity 1: Appreciate motivational needs of employees/staff	Yes	It is appreciated that staff would like more acknowledgement for their work and special efforts.	-	Find out if staff actually want to take on more responsibilities, or rather WHICH staff would like more responsibility. Acknowledgement of work is not carried out effectively by management - needs to be improved.
Activity 2: Appreciate education and level of competence of staff	Yes	It is clear that more educated staff perform better. Informal recognition of abilities.	-	Formulating all job descriptions - could then ascertain whether people are competent. Look for more educated people when employing new staff.
Activity 3: Identify & understand the nature of all activities or tasks to be performed in the manufacturing cycle and other organisational functions	Yes	The quality manual documents processes. However, processes of individual work functions are not documented.	-	Compile manual describing detailed nature/sequence of all jobs to be performed. Compile staff handbook.
Activity 4: Identify how accountability is - defined - administered - followed up	No	If faults are found on the line, the operator who caused the fault is located, if possible, and are told of the fault. the object is for operators to learn from their mistakes. No trends are recorded - relies on the memories of supervisors and management.		-
Activity 5: Identify which tasks / activities staff are presently accountable for	Yes	Their current job functions and responsibilities	-	Could be formally documented.
Activity 6: Identify which tasks or activities staff can be made accountable for	No	Not performed on any formal basis	-	Management needs to analyse processes and responsibilities and decide on which responsibilities can be delegated down the chain of command. Quality control can be delegated down. Instil a questioning culture. Operators should question: - Is it necessary what I am doing? - Is there a better way of doing it? - How could I do it better?
Activity 7: Give staff more accountability by giving them more freedom to make their own decisions	No	-	-	
Links:	1/2-3, 3/4-5, 5-6, 6-7			

Comparison of Conceptual Model 8 with the problem situation at Rhomberg Bräsler				
System activity	**Does the activity take place in the real situation? If so, how is it performed?**		**By what criteria is the activity judged, if any? / Measure of performance?**	**Comments / Ideas for change? / Recommendations / How?**
Activity 1: Appreciate that activities in the organisation require information regularly communicated	Yes	Management realises this and often communicates to staff that they must not hesitate to use any of the communication channels available to them and that one cannot overcommunicate.	-	An investigation into information needs / information technology / computer systems as well as effectiveness of internal formal and informal communication, needs to be conducted. Orders received form distributors and customers need to be processed in a much quicker and effective way. Simplify process. Train customers, distributors and RB employees on the correct use of the ordering codes. Try and employ JIT - manufacture to order - not for stock. Needs radical rethink.
Activity 2: Identify people/ departments who would use an information service or communication channel	No	-	-	
Activity 3: Appreciate modern and up-to-date information technology	No	Only top management may be aware of modern and sophisticated Information Technology systems.	-	
Activity 4: Assess current information technology/ communication channels	No	Perhaps on an ad hoc basis by top management.	-	There are no IT people within the organisation. Consultants could be called in to assess the company's IT requirements for today as well as for the future.
Activity 5: Determine peoples' / departments' capability of using information service or communication channel	No	-	-	Information channels are set up and employees and management use them, but there is no measure of how well information is communicated. For instance, the Chairman thinks that he is informing his employees, but they do not understand what he is trying to get across. Perhaps have smaller, more interactive meetings, rather than house meetings. Capabilities with a new information system could be assessed once new information channels or systems are implemented.
Activity 6: Compare skills required with capabilities	No	-	-	-

Activity 7: Identify/ determine requirements of people or departments	No	MRP not working well	-	Employees could on a regular basis be requested to formally think of and suggest information that they might require, or suggestions for better information flow. Need new/upgraded info system - system rethink. Look at reduced time in data-capturing eg. the use of barcoding.
Activity 8: Identify skills required	No	-	-	-
Activity 9: Obtain/develop necessary skills	No	-	-	-
Activity 10: Plan/organise information channels / technology so as to meet these requirements	Existing communication channels are used by management and staff, but not effectively.		-	-
Activity 11: Define measures of performance in terms of - effectiveness - efficacy - efficiency - comprehen-siveness	No	-	-	-
Activity 12: Monitor activities, including evaluating the comprehensive-ness of information provision	No	-	-	-
Activity 13: Know resource constraints (money, people & technology)	Yes	Management keeps themselves aware of this but does not necessarily share this awareness with staff.	-	-
Activity 14: Take control action	No	-	-	-
Links:	1-2, 2-5/7, 5/8-6, 6-9, 3/4/9-10, 10-8			

Comparison of Conceptual Model 9 with the problem situation at Rhomberg Bräsler				
System activity	**Does the activity take place in the real situation? If so, how is it performed?**		**By what criteria is the activity judged, if any? / Measure of performance?**	**Comments / Ideas for change? / Recommendations / How?**
Activity 1: Identify/ understand normal work processes and organisational structures	No	Production staff usually only understand their own work tasks and not those of others. Thus, they do not necessarily appreciate the work of others and the effect of their disturbance on somebody else's work.	-	Offer more training on the line as a whole as well as the requirements of individual jobs.
Activity 2: Appreciate staff need for being: - accepted - good at his/her work - responsible - looked up at - belonging to a group	Yes	Natural appreciation	-	-
Activity 3: Appreciate different personalities	Yes	Natural appreciation	-	-
Activity 4: Appreciate negative aspects: - too much socialising affects work efficiency - lack of discipline	No	Production line staff do not realise the importance of disciplined work on the production line with the necessity for socialising activities to take place after work hours. Discipline could be improved. Perception is that line operators don't care too much about maintaining or improving output level - people still slack off wherever they can.	-	Incentive scheme would spur staff to be more disciplined to only socialise after work hours in order to be as productive as possible during work hours. Discipline would thus be improved.
Activity 5: Determine how good social lives can be maintained without affecting work efficiency	No	-	-	Close co-operative working relationships bring people closer together as a team, and thus naturally lends itself to good relationships between the employees.
Activity 6: Adjust processes and structure / discipline to stop socialising during work hours, while developing team spirit and a sense of family / belonging	No	-	-	Obtain suggestions from management and staff. Incentive scheme. Perhaps use more partitions on the production line. Instil a hardworking and disciplined attitude in all workers
Links:	1/2/3/4-5, 5-6, 6-4, 5-7			

Comparison of Conceptual Model 10 with the problem situation at Rhomberg Bräsler				
System activity	**Does the activity take place in the real situation? If so, how is it performed?**		**By what criteria is the activity judged, if any? / Measure of performance?**	**Comments / Ideas for change? / Recommendations / How?**
Activity 1: Appreciate nature of production line activities and objectives	No	Most employees are/or should be aware of and should appreciate all processes and programs.	No measures, but some employees might not appreciate certain processes and programs.	More training and/or awareness programs.
Activity 2: Carry out profit generating operations	Yes	Designing, Manufacturing, Distributing and selling process control products.	Turnover. Profits generated.	-
Activity 3: Assess costs: - material - people - equipment - overheads	Yes	Budgeting and recording of expenses.	Expenses compared with budget	-
Activity 4: Minimise costs	Yes	Budgeting and trying to keep expenditure within the budget. Analysing and acting on Price variance reports.	Expenses compared with budget	The system could be more effective if the company engaged in business process re-engineering as well as in value engineering. Non value added activities need to be eliminated and products need to be examined for the use of cheaper components as well as re-design for easier and less costly assembly.
Activity 5: Appreciate market related selling prices of units	Yes	Executive management, Export and RBE perform this function.	Comparison with competitors' products as well as reaction from distributors and customers to current selling prices and price increases.	Devise method of explaining to staff (ensuring that they understand) how profits are generated and re-invested to fund the company's growth - hence everybody's secure future with the company.
Activity 6: Set max. viable prices of products	Yes	Formal printing of price lists when product prices are increased	-	
Activity 7: Sell products	Yes	RBE and Export	-	
Activity 8: Generate and determine profits	Yes	Accounting function	-	
Links:	1-2, 2-3, 3-4, 4-2, 5-6, 2/6-7, 7-8			

Comparison of Conceptual Model 11 with the problem situation at Rhomberg Bräsler				
System activity	**Does the activity take place in the real situation? If so, how is it performed?**		**By what criteria is the activity judged, if any? / Measure of performance?**	**Comments / Ideas for change? / Recommendations / How?**
Activity 1: Appreciate workers' demands	Yes	When workers approach management with demands, management is willing to listen	-	-
Activity 2: Appreciate union's demands	Yes	When union approaches management with demands, management is willing to listen	-	-
Activity 3: Ascertain what minimum wages are	Yes	Compliance with Industrial Council rates	-	-
Activity 4: Decide on minimum wage levels which can be paid as well as provide the minimum of facilities	No	-	-	Wage levels paid on the production line are well above the industry norm. Facilities provided to staff members are exceptional in terms of facilities provided to factory staff.
Activity 5: Pay minimum wages Provide no unnecessary facilities	No	-	-	
Links:	1/2/3-4, 4-5			

Comparison of Conceptual Model 12 with the problem situation at Rhomberg Bräsler				
System activity	**Does the activity take place in the real situation? If so, how is it performed?**		**By what criteria is the activity judged, if any? / Measure of performance?**	**Comments / Ideas for change? / Recommendations / How?**
Activity 1: Appreciate chairman's need to enhance his own personal image	Yes	People are aware of the chairman's need but it may not necessarily be appreciated.	-	-
Activity 2: Appreciate operations, manufacturing and quality processes and programs	Yes	By being aware of or knowledgeable about the operations. The degree of knowledge varies greatly from one employee to the next	-	-
Activity 3: Decide on how to promote or take credit for the manufacturing facility and its programs and processes	Invite people from outside the organisation to come into the factory and to be personally guided on tours around the factory by the chairman himself in order to take credit for his involvement in the growth and development of the production line, whilst promoting the company to the person.		-	Make sure production people don't get the wrong impression - that is when the chairman is spending time on the production line, it is for his own good, and not for reasons of showing interest and appreciation w.r.t. operators' jobs.
Activity 4: Take credit for the production line, its development and involvement in the realisation of its growth and development			-	
Links:	1/2-3, 3-4			

Comparison of Conceptual Model 13 with the problem situation at Rhomberg Bräsler				
System activity	**Does the activity take place in the real situation? If so, how is it performed?**		**By what criteria is the activity judged, if any? / Measure of performance?**	**Comments / Ideas for change? / Recommendations / How?**
Activity 1: Appreciate manufacturing activities	Yes	Most employees are/or should be aware of and should appreciate all processes and programs.	No measures, but some employees might not appreciate certain processes and programs.	More training and/or awareness programs.
Activity 2: Appreciate staff involvement	The rest of the organisation as well as some management perhaps do not appreciate staff involvement.		-	-
Activity 3: Appreciate management involvement	The rest of the organisation as well as some staff perhaps do not appreciate management involvement.		-	-
Activity 4: Decide nature of relationships between management and staff w.r.t. manufacturing activities	No	-	-	-
Activity 5: Look for opportunities for providing support and assistance	No	-	-	Create more structures, or improve existing ones, which provide points of contact between management and staff members.
Activity 6: Receive request for support or assistance	No	-	-	A process whereby staff can consult management, or vice versa, on each others' needs and expectations, as well as maintaining the effectiveness of the consultations.
Activity 7: Decide on support and assistance w.r.t each relationship	No	-	-	-
Activity 8: Provide support and assistance	No	-	-	Management could ask staff on a formal basis: "What can I do to help you to do your job better?"
Links:	1/2/3-4, 4/5/6-7, 7-8			

Comparison of Conceptual Model 14 with the problem situation at Rhomberg Bräsler				
System activity	**Does the activity take place in the real situation? If so, how is it performed?**		**By what criteria is the activity judged, if any? / Measure of performance?**	**Comments / Ideas for change? / Recommendations / How?**
Activity 1: Appreciate production line activities	Yes	Most employees are/or should be aware of and should appreciate all processes and programs.	No measures, but some employees might not appreciate certain processes and programs.	More training and/or awareness programs.
Activity 2: Appreciate need for production expertise	Yes	Management and supervisors realise that due to the nature of electronics manufacture, certain skills are definitely required.	-	-
Activity 3: Record experience and skills of production staff	A system called 'ILUX' has been used in the past but is no more operative - was not successful. Operators are presently graded in terms of Industrial Council grades of operator.		-	Compile manual describing detailed nature/sequence of all jobs to be performed. Revive or preferably redesign system to record skill learnt by operators and also their flexibility. Link skills learnt to wages. Eventually eliminate Industrial Council grading system.
Activity 4: Assign staff to new tasks			-	
Activity 5: Record experience and skills acquired by production staff			-	
Links:	1-2, 2/3-4, 4-5, 5-6, 6-2			

Comparison of Conceptual Model 15 with the problem situation at Rhomberg Bräsler				
System activity	**Does the activity take place in the real situation? If so, how is it performed?**		**By what criteria is the activity judged, if any? / Measure of performance?**	**Comments / Ideas for change? / Recommendations / How?**
Activity 1: Appreciate structures within RB	Not in any formal way. However, only by way of the structure of the organisation in terms of different departments and people with different job descriptions.		-	-
Activity 2: Appreciate divisions between departments and employees			-	-
Activity 3: Define what constitutes: - an overlap - a conflict	No	-	-	An overlap occurs when there is a task to be performed which does not fit exactly into one person's job description. Thus, people tend to 'pass the buck' and can often cause conflict.
Activity 4: Investigate: - present overlaps - present conflicts	No	Overlaps do occur but it is not always a problem. Some people are willing to take on other's tasks if they are not very busy.	-	-
Activity 5: Define energy wasting	No	-	-	Energy wasting is when there is conflict resulting in a lot of discussion about certain issues without resolving any of them. Continuous 'passing the buck' is also energy wasting and time consuming. Problems should rather be sorted out immediately.
Activity 6: Investigate: - potential overlaps - potential conflicts which could be energy wasting	No	But there is a lot of 'finger pointing' because certain people are not 'pulling their weight'.	-	-
Activity 7: Discuss ways of eliminating or reducing destructive conflict and job overlap	No	-	-	Many members of management have a lack of people management skills. They need to develop these skills - perhaps via training programs or workshops. Conflict between members of management needs to be sorted out on a continual basis in order to maintain harmonious relationships and effective management.
Activity 8: Decide on and implement ways or processes of eliminating or reducing destructive conflict and job overlap	No	-	-	
Links:	1/2/3-4, 4/5-6, 6-7, 7-8			

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