# The Development of a Theoretical Model for Use in Manufacturing Management in South Africa's Challenge to Become World Competitive

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# ABSTRACT

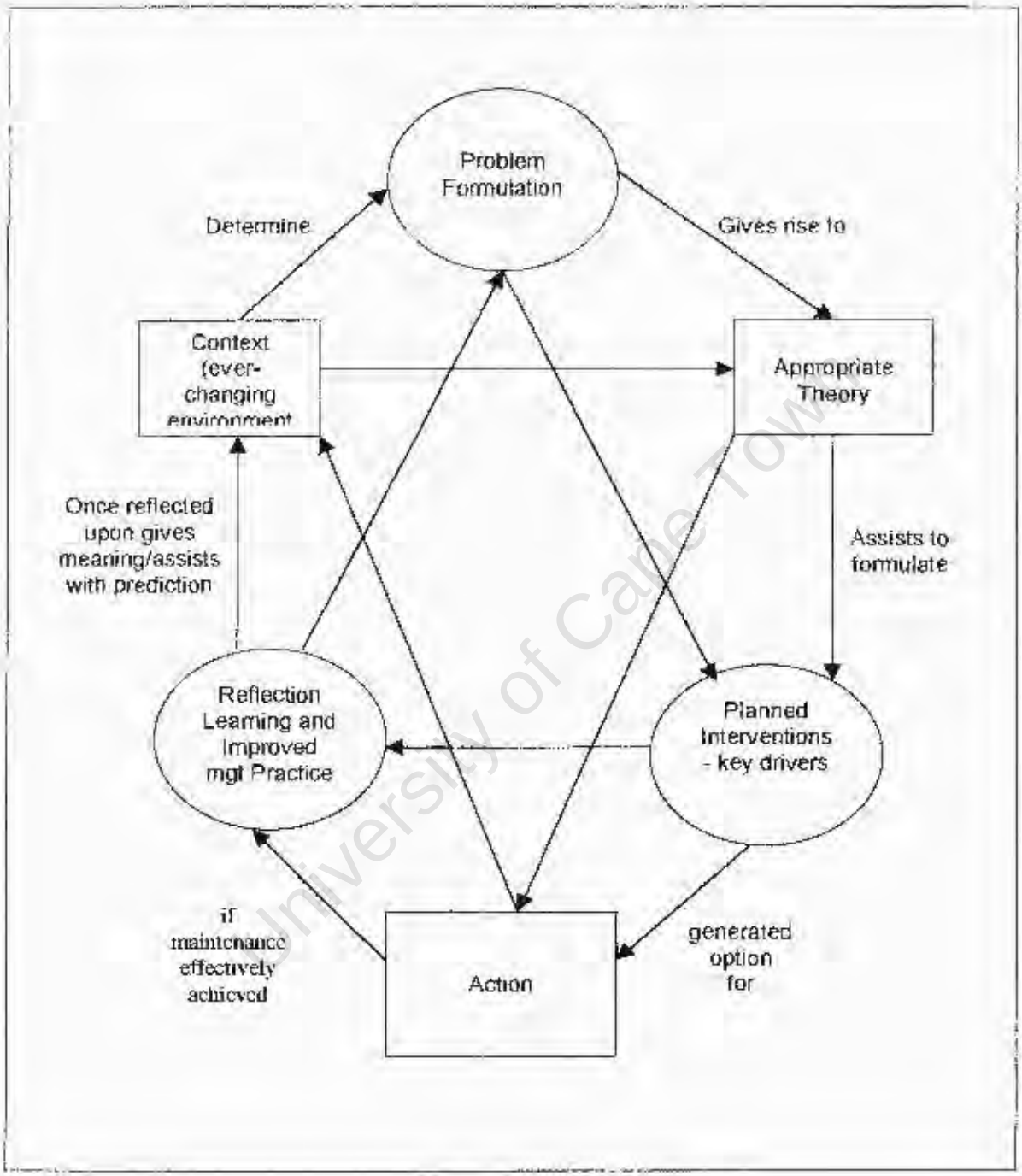
The objective of this thesis is to contribute to the development of a philosophical framework and a methodological approach for use in manufacturing management in South Africa. It is written within the context of the 1990s when there was an absolute requirement to transform management to achieve global competitiveness.

Deming's Profound System of Knowledge and other key appropriate theorists are used to arrive at the heart of the problems facing South African manufacturers during this time. An adjusted Action Research (AR) methodology is used as the process vehicle. Various planned interventions are assessed in order to contribute to the writer's learning and improved management practices.

Using a six-part process shown in Model 1.1 the chapters take the following steps:

1. An analysis of the environmental context in which the problem is formulated.
2. A problem formulation claim postulating what is predicted given the contextual background.
3. The construction of a philosophical framework based on Deming's Profound System of Knowledge with other content and process theorists as inputs.
4. Some planned intervention steps in an automotive component company.
5. Some final recommendations learnt from the process and what it contributed to improving management practices.
6. A conclusion as to what was learnt from the entire process.

The models on the following pages give a systems view of the thesis framework, conceptualised as a transformation process. The first model gives a generic framework of the transformation process whilst the second gives the outline of the project that the writer undertook.




Model 1.1: Thesis Framework – Conceptualised as a Transformation Process

# CONTENTS

**CHAPTER THREE: PHILOSOPHICAL THEORETICAL FOUNDATION —SYTHESIS AND FRAMEWORK**

**CHAPTER FIVE: RECOMENDATIONS**



**CHAPTER SIX: REFLECTIONS AND EVALUATION**

# LIST OF MODELS AND TABLES

# LIST OF ABBREVIATIONS

| | |
|---|---|
| Action Research | AR |
| African National Congress | ANC |
| Affinity Diagram | AD |
| A ,S Transmission and Steerings | ASTAS |
| Business Idea | BI |
| Computer Numerically Controlled | CNC |
| Customers, Actors, Transformation, Worldview,Owners, Environment | CATWOE |
| Completely Knocked Down | CKD |
| Capably Capability and Flexibility | CCF |
| Engineering Change Design | ECD |
| Failure Mode Effect Analysis | FMEA |
| General Agreement of Trade and Tariffs | GATT |
| Heavy Commercial Vehicles | HCV |
| Interrelationship Diagraph | ID |
| Joint Ventures | JV |
| Learning | L |
| Mercedes Benz | MB |
| Mental Models | MM |
| Motor Industry Development Programme | MIDP |
| Murray and Roberts | M&R |
| North American Federation of Trade Organ | NAFTO |
| National Metalworkers of South Africa | NUMSA |
| Original Equipment Manufacturers | OEM |
| Plan-Do-Check-Act | PDCA |
| Profound System of Knowledge | PSoK |
| Quality Management System | QMS |
| Situation, Concern, Question, Answer, Review Evaluation | SCQARE |
| Scientific Method in Management | S.M.Mgt(SM) |
| Soft Systems Methodology | SSM |
| South Africa | SA |
| Statistical Process Control | SPC |
| Systems Thinking | S.T |
| Strengths, Weaknesses, Opportunities, Threats | SWOT |
| Theory of Constraints | TOC |
| Theory of Knowledge | TOK |
| Theory of Psychology | TOP |
| Theory of Systems | TOS |
| Theory of Variation | TOV |
| Total System Intervention | TSI |
| Viable Systems Model | VSM |
| Viable System | VS |

# List of Appendices

# CHAPTER ONE
# CONTEXT

## 1.1 INTRODUCTION

This thesis acknowledges the changing business environment that the automotive manufacturing sector in South Africa has faced in the past six to eight years during the 1990s. These effects took the form of the changes of the new African National Congress (ANC) government political initiatives and the ever faster-changing effects the global economy has on the South African economy and particularly the automotive sector. Raymond Parson (1999) in the *Business Day* of 26 February 1999 said: "For SA business it seems the two dominant forces are globalisation and democratisation."

The chapter raises the issues in the environmental context facing manufacturing in South Africa.

The writer gives the background to the context of the research problem. This context is broken into three sections – South Africa, Global Automotive Industry Dynamics, and ASTAS (Pty) Ltd specifically.

The chapter is written in narrative form and covers an historical and more current perspective.

The context provides the backdrop for understanding and formulating the problem.

## 1.2 THE SOUTH AFRICAN CONTEXT LEADING UP TO THE 1990s

### 1.2.1 Political influences

South Africa, after 47 years of a laager economy, focused inwardly and, existing mainly on its own domestic economy had to change. The world economies have marched ahead while South Africa wallowed in isolation. Dwindling in the competitive spirit that other countries have been adapting to, and faced with jumping from the southern tip of Africa into the fast-moving, highly competitive global economy, is a major quantum step.

The National Party policies focused on preferencing the white community in South Africa and as a result of this a multitude of sanction strategies were used economically to force them to change their policies. Resulting from this economic protectionism was the basis of the economy.

Employment was created mainly from the government organisations, the mining sector together with the agricultural sector. White dominance in all these industries as well as the government sector with a focus on investments that secured internal (in global terms) survival was practised.

Resulting from this a bureaucratic and very uncompetitive work ethos evolved. Protectionism with high import duties was required to fend off the world competitors from Europe, the Far East etc. The local manufacturing industry was inwardly focused, and domestically orientated toward a captive local market. Consumers had the choice of locally, relatively expensive, goods (in world standards) and exorbitantly priced imported goods.

With the unbanning of the ANC in 1990 and the 1994 first democratic election this all changed and dramatically so. The economy that was underpinned by the mining industry was to now compete with economies and companies that had become very competitive over the previous two decades.

The new government's most significant economic move was to be a signatory of the General Agreement of Trade and Tariffs (GATT). This effectively reduced import duties on a steep sliding scale and attempted to position South Africa to compete globally.

### 1.2.2 Economic Factors

Our quality had been acceptable to a closed market, together with global market expectations and the flood of competitive goods that became available, and the market expectations both locally and abroad had vastly changed.

South Africa is now in a similar position to North America in the 1970s when Japanese goods at lower cost and latterly higher quality changed the American consumer's perception of quality. The Japanese threat to American manufacturers provided the catalyst for American companies to improve quality. In South Africa quality has to become non-negotiable.

South Africa no longer is in isolation; information flowing across borders, satellite television, facsimiles and the Internet tell us instantly about new products and services. In order to improve the standard of living, countries must trade goods and services with other countries. Trade is a two-way process and to be able to import goods, goods must be exported to pay for the imported goods. Therefore quality of a product or service can only be achieved if it assists the organisation to enjoy an improved and sustainable market share.

During 1995-1997 the economic policies of previous governments were being thoroughly inspected and reviewed. Of great significance to the business community was the signing of the GATT agreement and the decision to remove the trade tariffs over time

South Africa after the 1994 general elections took a decision to position itself back into the world economy. This required the removal of the protection of the import duties so as to equalise trade conditions. South African manufacturing companies had not competed in world economic terms during the past 20 years and were very uncompetitive.

The automotive industries Motor Industry Development Programme (MIDP) after five versions of protecting the local automotive industry introduced phase 6 which had as its main goal the making of the local South African automotive industry globally competitive.

During 1989 the phase 4 of MIDP was introduced, providing a 50 per cent protection. An additional advantage was that all imports of components were deemed as local. This protection lasted until 1995 with the introduction of the M IDP phase 6. This plan immediately reduced duties on components to 30 per cent with gradually reducing duties to 15 per cent by the year 2000.

The protection offered by the Motor Industry Development Plan for heavy commercial vehicles (HCVs) are as follows:

1996 - 30 per cent
1996 - 27,5 per cent
1997 - 25 per cent
1998 - 22,5 per cent
1999 - 20 per cent
2000 - 15 per cent

These duties can be offset by exports of vehicles or components. Duties under the passenger car programme are higher, and the two programmes are not separated when duties are being offset, thus the reduction in duties through passenger car exports can be utilised to import HCVs. The Original Equipment Manufacturers (OEMs) decided that they could export vehicles (mainly passenger) and components and use these duties rebates to import completely knocked down (CKD) HCVs more beneficially than purchasing locally. Additionally the local product had

outdated technology. Due to the current product in order to facilitate imported products at a cheaper cost was initiated in April 1999.

### 1.2.3 A Backdrop of South African Management Practices

Given the sociopolitical and isolationary era that faced South African management it is evident that in the main their exposure and experience to the modern management practices has been limited. With the hub of the business sector evolving from the large mining roots and the strong white dominated bureaucracy of government it can be assumed that the management style was autocratic and bureaucratic at best.

The human relation's influence on management has happened in the last twenty years and has been fairly influential of recent times. Diversity in management ranks is only now becoming an influence.

As a general statement it can be said that the style of South African managers is one of arrogance, dominance and self centredness. The exposure to the global arena together with the sociopolitical influences is bringing about the need for change. This change requires a new fundamental approach and will be the basis of this thesis.

## 1.3 GLOBAL AUTOMOTIVE INDUSTRY DYNAMICS

Due mainly to the overcapacity in the developed countries, the dominance of the Americans in their domestic market and the Europeans in theirs as well as the need for both to go global, and the need to play in the emerging markets of South East Asia, South America and China, the major automotive players developed global strategies.

The worldwide automotive industry had undergone a metamorphosis of previously wanting to control every process in the manufacture of motor vehicles to the holding on to the vehicle design, the engine manufacture and the final assembly only. The change forced rationalisation and focused many sub-suppliers into high-volume component manufacturers supporting the major assemblers. This led to the concept of systems suppliers and component suppliers, supplying system suppliers.

The need to develop technology and supply partnerships became imperative. The opportunities would be severely dampened if no global connections of some sort were created. The global

process, if connected to a big player, would bring an order book as well as support in the manufacturing process and technology development.

International automotive companies have moved towards focused manufacturing such as the world volumes of right-hand drive BMW 3 series are made in South Africa and the 5 and 7 series are made in other plants in the rest of the world. What is necessary for most South African manufacturers is to enter into some form of partnership with an international company in the automotive industry. If this were to be achieved, the South African factories could become 'focused factories' within the entire global family of that global organisation.

The opportunities would be severely dampened if no connection of some sort was created. The technology development factor would be affected in particular. The global process while connected to a big player would bring an order book as well as support in the manufacturing processes.

A worldwide increase in merger activity is one of the more tangible aspects of globalisation that is affecting South African companies. This process is affecting today's South African automotive manufactures. Examples of this are Nissan Motor Company of Japan acquiring Sanlam's 37 per cent interest in Automakers, Ford Motor Company acquiring a further 35 per cent stake, and General Motors buying a 51 per cent share in the Delta Motor Company.

## 1.4 A.S. TRANSMISSIONS AND STEERINGS (PTY) LTD SPECIFICALLY

A.S.Trasmissions and Steerings (Pty) Ltd (ASTAS) was established to capitalise on the protection provided to the South African manufacturing industry in the form of import tariffs, whereby import duties on transmissions and drive trains were set at 50 per cent. This environment set the stage for the company to invest a large amount of capital into manufacturing gearboxes and drive axles for the South African truck manufacturing industry during the 1980-1993 period. This enabled the company to maintain a captive market, due to the fact that the truck manufacturers either sourced from ASTAS or paid the prohibitive import duties to use imported drive trains.

This situation changed drastically in 1994 when South Africa became a signatory to GATT. Import tariffs immediately dropped to 30 per cent and were reduced timeously to 15 per cent by the year 2000.

### 1.4.1 Overview Describing the Situation

ASTAS was South Africa's leading manufacturer and distributor of high-quality HCV driveline assemblies (manual transmissions and drive axles). In addition the complementary product of trailer axles and suspensions, spare parts and steering equipment was offered. The main customer base was the heavy commercial truck and coach OEMs.

This Boksburg-based company was initially owned by General Mining's subsidiary Sandock Austral, with minority shareholding by the German licensors, (Z.F.and Mercedes-Benz (MB). The local shareholding was subsequently transferred to Malbak, and recently (1995) to Murray & Roberts Engineering (M&R).

The license agreements that gave important support from ZF and MB were critical in the early stages. The entire capability of the plant was facilitated by the licensors. All resources necessary were recommended to ensure the successful manufacture of a trademark product in the South African market. This included layouts of appropriate machine tools, proven process plans, tooling and fixtures, licensor-sourced raw materials, Engineering Change Decisions (ECDs) and the training of people - in fact every possible resource.

The South African economy had had its ups and downs during the 1981-1999 period and five versions of the MIDP had been in place. The previous versions protected the local manufacturers to a 50 per cent duty level and this had been adjusted mainly to encourage the local manufacturers and industrialisation of the less sophisticated components that substituted the import of those parts. In 1995 the tariffs were adjusted in MIDP6 downwards to 30 per cent with immediate effect. Once the tariffs had dropped from 50 per cent to 30 per cent in 1995 the fully imported trucks as well as local OEM truck manufacturers nominated to specify new technology drive trains from mainly their parent companies. From the seven competitors in 1994 there are now in excess of 27 competitors in the same market.

During the period 1981 to 1994 ASTAS had a market share of over 60 per cent of the domestic transmissions sales and 30 per cent of domestic market drive axle sales. This had been as high as 20 000 units in 1983 and had dropped to less than 7000 vehicles (1999-2000).

The success of ASTAS was attributed to the appropriate products offered to the heavy vehicle market, the high local product content which provided cost advantages, and a high quality of products that met international standards with the support of the licensors.

The ASTAS factory was accredited with ISO 9001 and QS9000 quality systems. In addition ASTAS planned to be accredited as a VDA 6 quality system manufacturer during the 1999 year.

The space available was 35000 $m^2$. Operations included precision machining and heat treatment. Additional processes included grinding and final product assembly. The factory also incorporated a buffer store and packaging area.

All the materials, which included cast iron, ductile iron, aluminum and forgings (alloy steels), offered special properties required for the optimum, safe and reliable operation of components, even under the most averse on- and off-road conditions and for distances that are warrantied in excess of one million kilometres.

The high strength and heat treatment capabilities of alloy steels render them ideally suited for the manufacture of gears and shafts for transmissions and drive axles. Cast iron, used for the manufacture of transmission housings, and ductile iron, used for the manufacture of drive axle housings, both offer the advantages of structured strength, ease of machining, damping characteristics and cost effectiveness.

All materials and castings, which arrived at the ASTAS factory, were machined on multi-purpose Computer Numerically Controlled (CNC) machines, (vertical lathes, drilling machines and machining centres). All machining was done in accordance with the stringent requirements of the ISO and QS quality standards. Initially capability studies and the quality control on all the components were evaluated through statistical process controls.

ASTAS' exports were limited to a range of trailer landing legs. Other export opportunities for precision-machined gears, shafts and housings were considered in the late 1980s back to the licensors in Europe. However none of these materialised due to the high-handed and arrogant relationships precipitated by our previous senior management.

### 1.4.2 Markets and Marketing

In the heavy commercial vehicle local market sectors the size of the local market diminished from approximately 20 000 units in 1983 to less than 7 000 units p.a. in 2000. Previously the market was not competitive (in global terms) as it was protected. The number of competitors at seven in 1990 almost doubled overnight with new entrants Volvo, Scania, Renault and Iveco from Europe and Freightliner, International and Peterbuilt from America. All those new entrants are fully imported and have captured large segments of the shrunk market. *Fleetwatch* magazine (February 1999) said that there are in excess of 27 competitors in the current HCV market.

The strategies of the new market entrants were to overtrade the second-hand truck market in order to achieve new market sales. Historically, the small fleet truck owner would purchase second-hand products with ASTAS products installed. They can now purchase a new value-for-money truck generally fully imported with no ASTAS product in it.

ASTAS's market share dropped significantly for the above reason as well due to the fully imported trucks and the local OEM truck assemblers nominating to specify new technology products from their parent companies. 1997 alone saw the loss of Delta and Toyota as customers. In 1998 Nissan, ERF, Reumech, Leyland were lost as customers. MAN only purchased the latest aluminium gearbox and had ceased purchasing drive axles. During 1999there were only two customers; MB and MAN.

An illustration of this is that ASTAS's largest customer, constituting 75 per cent of sales, was MB. MB (by 1999) only had 17 per cent of the market and had introduced an American-styled truck, to match what the competitors were offering customers, hence further diminishing the sales opportunities of ASTAS.

The ZF (gearbox) license agreement in particular restricted any sales of licensed products to South America and Western Europe. This limited the marketing opportunities beyond the South African borders, unless the strategy chosen was to become a competitor to our licensor, which would have obvious disastrous effects.

This restriction created a mental block for some years in assessing the new market opportunities that would need to be challenged to make ASTAS viable in its future. It was only when the local market situation got so desperate that in early 1997 the thought to compete against the previous licensor and consider trading in Europe, East Asia and North America was considered.

An opportunity existed for new markets in developing countries where the applicability of the product lines suited the level of road infrastructure. These possible focused markets could be participated in with ASTAS's current product line-up. These possible markets were Africa, Eastern Europe, the Middle East, India, Indonesia and Malaysia. The relative maturity of these countries and their road and transport systems made them appropriate. However, the price competitiveness in these markets due to a history of poor quality product sold there is very tough. The other issue to be aware of was where licensors had licensed these markets exclusively to other organizations.

The local market situation forced MB, ASTAS's biggest customer, to bring forward their decision, by one year, to launch their new product into South Africa. This product did not have ASTAS drive trains specified.

The push to find export markets for drive trains in earnest was only initiated in late 1997 when firstly an Indonesian joint venture (JV) partner was considered. This would be to go against the licensors who at the time were still shareholders. Additionally the possibility of considering high volume manufacture of components and spare parts was considered to global markets. This was also against the license agreements. Both these would need substantial ± 50 per cent resourcing to local raw material that had historically come from overseas licensors. Either way ASTAS would be forced to seek 40-80 per cent of its sales from export markets.

### 1.4.3 Product Technology

At its origin and in the first two years, ASTAS concluded a number of license agreements to manufacture, assemble, market and distribute to OEMs and the after-market, driveline products such as gearboxes and drive axles. Many of these agreements for different product lines lapsed and were not to be renewed. With the 17 years of existence of these licenses when technologies were generated these smaller technological changes were passed on within existing products. A time came when a major technological jump was planned. ZF and MB/MAN chose, partly due to the automotive industry global dynamics and the various strategies by the large players and partly due to the poor senior management relationships that had developed with our licensors, not to include ASTAS in this process. ASTAS was left out of the opportunity to stay with partners that would support it into a viable future. The strategy of the likes of ZF, MAN and MB is to either follow the far greater emerging markets such as North American Federation of Trade (NAFTO) (US markets), China, South America and Indonesia. This required them to focus their manufacturing facilities in the plants where they see the benefits of the investment assisting in capturing those markets.

When the license agreements lapsed, the support services of product development, quality and warranty analysis diminished or ceased to exist. In some cases less expensive volume driven sources of bought-out purchased components were forfeited.

The level of technology was also linked to the life cycle of the product and the application of the technical level of the product in appropriate markets. Older drive line product technology in less sophisticated countries with similar road infrastructures to that in South Africa are the likes of India, Malaysia, Indonesia, the rest of Africa and China. The licensor realizing this has chosen to

either sell licenses into these countries or put up joint venture investments. Only if ASTAS could match up to these requirements could it fit into a network of being a global supplier.

### 1.4.4 Senior Management Relationships

Initially in the early days of ASTAS very good relationships existed. This was due to the success of the business, the support of the licensors and the good relationships fostered by the senior management at ASTAS both into the local market place as well as with the licensors.

The previous managing director managed the company for nine years until he retired at the end of January 1997. An engineer by training and a very involved person in every detailed decision, he was an autocrat who ran a silo approach departmentally-driven organisation. The chain of command up and down the departmental ladders was the correct way to do things. An abrasive know-it-all (certainly in most management disciplines) person, he created centralised decision making. His dogmatic style left a less-than-flexible relationship with licensors and potential investors.

His self-reliance approach lost many opportunities to foster possible partnerships. These opportunities ranged from a whole host of business situations – raw material sourcing, new licenses, homegrown and poorly tested product design changes, etc.

Everything was centralised around this man. It left a climate of disempowered managers and employees. The hiatus that remained on his retirement left the management with very little experience in doing things responsibly themselves. His era was replaced with a person who was transferred from within the group who knew little about ASTAS. This MD had broader responsibilities and was often not there, creating a vacuum of orchestrated departmental manager relationships.

He encouraged all possible joint venture shareholding arrangements, product innovation, market opportunities and pricing policy changes that were clearly needed to break the mould of the past and take the opportunities of the future.

The old-style management led to a self-belief of engineering and manufacturing practices supported by good integrated IT systems being the only focus of the business. The downside that developed was that this absolute belief led to being self-righteous. Relationships soured with ZF and MB licensors when export orders back to Europe were offered and due to in principle

decisions lost as a result of pricing decisions. ASTAS would not compromise downwards by in one case 0,22 phenig for a large ± R20m component export order.

Internally the arrogance led to a mindset that 'theoretically' believed everything was good and okay but the reality of what the real capabilities were was not known and understood. This arrogance continued and affected other issues. The industrial relations climate in the plant was dented by a number of disputes with the National Union of Metalworkers of South Africa (Numsa), some of which remained unresolved. It filtered into the local market.

The senior management team was also key in fighting the MIDP 6 adjustments. Their absolute focus on fighting this and their lack of attention to the market place changes, the global dynamic, the souring of licensor relationship and the growing inappropriateness of the IT systems and engineering and manufacturing processes led them down a dead end.

### 1.4.5 Operational Impact of the Changing Context

International automotive companies have moved towards focused manufacturing, where one product i.e. the world volumes of right-hand drive BMW 3 series are made in South Africa and the 5 and 7 series are made in other plants in the rest of the world. What was necessary was for ASTAS to enter into some form of partnership with an international company in the automotive industry. The possibilities were ZF, Eaton and TRW. Should it have been achieved, ASTAS would have become a 'focused factory' within the entire global family of that company.

In the beginning stages licensors forced ASTAS to purchase raw materials from themselves to ensure product quality. This increased prices due to additional transport costs.

However, the initial MIDP programme encouraged localisation of raw materials. This ensured a movement towards local suppliers. Unfortunately this took much time and development cost, with inconsistent quality continuing to be a problem. Suppliers who were also not competitive for the same reason as ASTAS (regarding being domestically focused) took time to be good quality reliable suppliers. To this day the quality and reliability of the local suppliers is dubious especially for the long term where the future product is to be exported.

In the gearbox product, eight gearboxes with 48 variants to suite customers or application preferences were manufactured. In the axle product, approximately 36 variants of two product lines were offered for the same reason. Because of the MIDP over the years, 50 per cent of the above products were locally produced in the machine shop, using a mix of 60 per cent locally

supplied raw materials and 40 per cent outside, mainly overseas purchased parts to make the complete assembly. The production schedule thus needed approximately 350 gearboxes and the same number of axles per month. This translated into 1000 locally produced components in batches of 150 to 300. This was to be done in a plant that was laid out to produce high variety/low volume. This high variety/low volume production requirement, brought with it an immense number of operational problems.

The mindset and the wastage built into the system of queuing, moving and waiting time between processes has been strongly entrenched. Multi set-ups weekly were the norm where sometimes the tear down and set-up were longer than the run time.

Customers demanded zero per cent price increases over the last three years (1998-2000) and finally accepted only rate of exchange changes on the proportional input of imported component in the final assemblies.

As a result of this four retrenchment exercises took place from 1996 to 2000. ASTAS shrunk from a workforce of approximately 580 down to approximately 270. One of the retrenchments focusing on the reduction of salaried employees reduced the salaried headcount from 130 to 70.

Other cost-cutting exercises were necessary with no or very little latitude to increase sales prices and with the shareholders wanting their cut, the only place to unlock margin was in cost reduction.

ASTAS was liquidated in May of 2000 after Murray and Roberts sold it to an Indonesian investor who due to its own internal financial problems failed to come up with the asking price. With Murray and Roberts' stated strategy to reposition itself, and under the circumstances ASTAS was liquidated due to the nonpayment by the Indonesians.

Appendices 1 and 2 give a snapshot summary of the issues facing ASTAS in this time frame (1981-1995) (historical), 1996-1999 (Transitional) and >2000 (Potential future).

## 1.5 CONCLUSION

The contextual issues that face South African Manufacturers in the automotive sector in particular are summarised below and contribute to the problem formulation as input.

- the changing political scene towards democratisation
- the changing employment practices due to government pressure
- South Africa signing the GATT agreement and its speedy implementation
- a desire for South Africa to compete globally after many years of economic isolation
- expanding from a closed market selling to a global market marketing process
- moving from a mindset of isolation to that of a global competitor
- MIDP 1-5 being locally focused whilst MIDP 6 export focused
- the automotive sector world-wide in an era of reorganisation
- global supply arrangements becoming the norm
- South African Management practices needing to be reviewed due to the new context of business

For ASTAS specifically:

- seeking export opportunities
- a relatively capable factory needing a new strategic capability
- partnerships of the past thrown aside when most needed
- a desire to go it alone when alliances and joint ventures were required
- a need for product and marketing agreements with global players
- a need for the renewal of licence agreements in order to stay in the mainstream
- senior management needing to transform their management practices to survive in the context.

# CHAPTER TWO
# PROBLEM FORMULATION

## 2.1 INTRODUCTION

The summarised issue list of both the broader environmental context and the ASTAS-specific factors given at the end of chapter 1 that has been accumulated over the past three years acts as an input to the problem formulation. The research methodology used is summarised in the theory chapter three, and provides another input. The methodology acts as the processing steps to formulate the appropriate problem. Mitroff's 'Tough Questions that Challenge These Assumptions' is also a significant input.

The process steps used specifically in this chapter are the raising of the concerns and questions and the processing of them using Interrelationship Diagraphs (IDs). Additionally systems models are used to show the interconnectedness of the issues. Some indications of some of the answers are given as an early input.

The outputs are firstly the formulation of a systems model of the real problems boiling down to poor management practices. This gives rise to the second output being the problem argument that is formulated.

The problem was formulated over time with fresh intermittent theoretical inputs, and therefore there were a number of recursions.

The claim argues that given the dynamic complexity of the ever-increasing environmental variables at play, and the isolatory arrogant mental model of some South African managers, it is almost certain that company management and their organisations will fail unless they transform themselves using the framework founded on Deming's Profound System of Knowledge (PSoK) and synthesised with other appropriate content and process theories.

## 2.2 CONCERNS

The concerns that are raised in this section came from a number of recursions of the theoretical backdrops and the methodological process. Having provided the context (situation) the concerns and questions are formulated.

The early assumptions used when first starting out are important to put forward.

The early assumptions were that:

1. Change would not happen as quickly as it did.
2. Past successes would continue in the future.
3. The marketplace would change slowly over time and ASTAS would gradually adapt to these changes.
4. The licensors would assist during those changes.
5. The global automotive scenario would not affect South Africa until ±2003.
6. The MIDP changes were too severe to become competitive and needed to be revisited to continued protection, possibly at a lower level.

The concerns that were raised are enumerated below.

- The rate of changes happening together with the slow rate of adaptation from the management team.
- The less than appropriate management practices and the current mental model thereof, put management in a position of not being able to recognise and deal with the current and the future challenges.
- Given the isolatory years, the limited and inappropriate worldview and perception base senior management had, as well as the old paradigms and mental models they carried.
- The lack of a questioning approach as to whether there were new or improved ways of doing business was in place.
- Management practices focused each department on achieving optimum individual success at the expense of the whole company.
- As the increased number of variables continued to change so the fear of how to deal with this rose.
- A number of new opportunities were being shut down by senior management that were not skilled in building global and marketing partnerships for the benefits of the company.
- The mistaken view that the plant's capability was world class when it had not been 'in training' in world-class conditions was broadly accepted.
- Detailed market intelligence was not being gathered to assess the possible opportunities and threats in the new environment.
- The lack of analysis of the interconnectedness of the parts working as a whole was not established.
- The old departmentalised approach to managing a company and an emphasis on one department's success to the detriment of the whole.
- Not understanding the systems at play.

- The lack of understanding of when to change one of the variables and not allow interference.
- The inability at dealing with complexity and increased variety.
- The inability of looking at the situation as a whole.
- The need to analyse systems in terms of feedback.
- The lack of ability to predict the future. Having no desire to use a theoretical base for gaining knowledge.
- When introducing the Quality Management System (QMS) the view that the quality department, who were the experts on Statistical Process Control (SPC) felt that their knowledge should not be cascaded into the whole as it would reduce their power of knowledge.
- The lack of real knowledge as to how SPC really worked.
- The inability to describe the real problem.
- The lack of really wanting to follow a disciplined method to get to the bottom of real problems.
- The lack of the right stakeholders being involved in the process.
- Not recognising the value of the past partnerships and rejecting the recommendation to establish fresh partnerships.
- Misunderstanding the real issues at play and putting effort and resources into this.
- Fear of uncertainty led to a closing down of information and a resultant loss of new opportunities and a 'bury your head' attitudes.
- The arrogant desire to go it alone and not build networked partnerships.
- Initially it looked like poor relationships with key stakeholders together with poor marketing based on poor leadership was at the heart of the problem.
- The inability to formulate an appropriate strategic capability.
- The lack of a questioning approach as to whether there were new or improved ways of doing business.
- The mistaken view that the plant capability was world class as it had been set up by licensors.
- The lack of the interconnectedness of the increased business variables.
- When finally wanting to change, choosing the wrong variable and affecting the situation to its detriment.
- Not assessing who the real stakeholders were and involving them.
- The inability to think about the future in a systemic way.
- The inability to transform strategies into actions by not choosing the right stakeholder.

A summary of the above concerns is given below:

- Inappropriate mental models that are not challenged and through discussion brought to a point of common understanding
- Dealing with the increased variety in a managed way
- The dynamics and fast process of change and the need to learn faster than change
- Recognising the changing environment and standing back, analysing it, assessing it in a systemic way so as to reposition the organisation
- Finding and capturing new markets and customers
- To detect the waning relevance of the domestic market and unlock other markets. The recognition of the importance of partnerships in expanding into export markets.
- Manufacturing uncompetitiveness
- Realising the resultant systemic uncompetitiveness effect of the whole of the South African economy that affected the competitiveness of South African manufacturing organisations due to the fuel prices, inflation, spiraling price increases and labour's lack of productivity.
- Attempts to reposition the company and create a new strategy, and unlock the mental models of the past to allow the learning to begin
- Think systemically and process the high variability in an increasingly complex environment
- The need to transform management.

## 2.3 QUESTIONS

After raising some of the concerns and summarising them into the key factors, it is appropriate to ask some important questions. Mitroff (1998) believes that tough questions need to be asked to challenge the assumptions (given in 2.2). He argues that much management effort is put into solving the 'wrong problems precisely'. He advocates further that much of the literature actually contributes in this direction. His view is to ask fundamental questions of the organisation. These are given below. Mitroff (1998:9)

- What business are we in?
- What business should we be in?
- What is our mission?
- What should our mission be?
- Who are our prime customers?
- Who should our customers be?
- How should we react to a major crisis?
- How will the outside world perceive our actions?

- Will others perceive the situation as we do?
- Are our products and services ethical?

Given the basic questions from Mitroff, the following questions after the theoretical inputs were raised.

- How do we deal with the understanding of the increased variety of variables impacting on the organization?
- How do we deal with the speed of the changes?
- How do we deal with the interactiveness of the variables or how do we think systemically?
- How do we adapt (act) speedily to these variables?
- What techniques and processes could be used to unlock the mindsets of management?
- How do we come to the realization that there is a requirement to create business partnerships? (shareholders, suppliers, customers, and employees)
- How do we create viability and sustainability for the organization's future?
- How do we reduce the arrogant, 'always right' syndrome amongst management?
- How do we create a questioning climate in the organization?
- How do we realize the ability to learn from each situation?
- What new thinking processes are required to learn from the changing situation?
- How do we tap into all the mental/human resources available in the company?
- How do we break down old paradigms and differing individual manager mental models and create common company mental models?
- How do we use rigorous productive reasoning to arrive at conclusions and solutions?
- How do we put newfound theories into use?
- How do we define and understand current mental models in the organisation?
- How do we get to grips with differing and conflicting mental models?
- What influence did inappropriate mental models of senior management have on the inability to reposition the organisation?
- How do we become flexible in order to take advantage of future opportunities?
- How do we build knowledge from the recursive nature of the learning?
- How could we build a system where intelligence is actively sought from a number of sources and then brought back processed and analysed?
- How could we identify potential export markets which did not impinge on our licensors' other licensed marketing areas?

- How do we ensure that the future order book is adequate to keep the installed invested capacity operational?
- How do we ensure the parts of the system (i.e. the departments) are interacting effectively together to contribute to the good of the whole?
- How do we gather good, reliable data as a basis for decisions?
- How do we ensure that good policy decisions are made, that are flexible to the current dynamic situation?
- How do we ensure that departments have measures that are appropriate to the performance of the whole system and not measuring local optima that in some cases are detrimental to the whole system's performance?
- How do we build in required controls and yet allow for the flexibility required in the scenario of a transitional period?
- How do we ensure that a study on a performance, or quality problem is properly statistically analysed?
- How do we ensure that the foremen understand the new challenges that face them?
- Why was the "relevancy" of ASTAS, given the impending known tariff changes and potential market and global automotive changes, not repositioned in ±1994 so as to move to a possible future viability?
- Why did ASTAS continue to pursue local markets only until late 1997?
- Did success in the local market lead to a complacent marketing attitude?
- Why was there insufficient timeous marketing information forthcoming?
- Why was there not a systemic processing of the market intelligence information?
- What was the local role of marketing and did it move to its new role of establishing new export business?
- Did the license agreements that were in place delay the task of exposing the possible export opportunities even against existing licenses?
- What were the flaws in the strategic thinking process that did not allow a variety of strategic options to be considered?
- Was the Business Idea (BI) chosen in 1997 appropriate and was it successfully revisited to keep it applicable?
- Why did the relationships sour between the major licensor and ASTAS?
- Why were possible joint venture (JV) partnerships with other possible partners (TRW, Eaton, Dana and the Indonesians) a failure?
- Why did the relationships sour with our traditional customer base?
- How do we reduce the arrogance, always-right syndrome?
- What mental models kept excessive overhead costs to grow businesses that were inappropriate?

- With the loss of the licensor support was it believed that we could go it alone?
- What manufacturing capabilities were impacted on in moving from a licensor setup with supported manufacturing facilities to a 'go it alone' situation?
- Did ASTAS have genuine capability in the past?
- How do we create a viability and sustainability for ASTAS' future?
- How do we create a fitness ready organisation for ongoing incremental change?
- How do we create a questioning climate in the organisation?
- How do we realise the ability to learn from each situation?
- How do we break down old paradigms and differing individual manager mental models and create agreed company mental models?
- What philosophical approach could have been used to create and maintain an appropriate strategic capability and a matching operational capability?
- What systems models could have been used to guide the company to manage complexity?

The questions raised start to give greater understanding to the contextual problems that the company faced. By raising the questions they also added to the possible resolution process. All the questions needed to be pondered upon.

A method of synthesing them into key factors was necessary. The ID process was used to do this. The results are given below.

## 2.4 THE INTERRELATIONSHIP DIAGRAPH PROCESS.

A number of IDs were used to analyse the contextual concerns and the questions raised. These results are shown in three IDs dated June 1998, May 1999 and November 1999.

The first of these focused on the external influences. The two issues having the largest impact were the lowering of the duties due to GATT and the poor internal teamwork. This resulted in the major outcomes being the inability to create the selling capacity required and the poor manufacturing cost base of ASTAS.

The second moved the focus to the factors within management's control. It should be noted that it was completed almost a year later. It shows the combined external influences and the lack of management's responsibility to adapt to the situation. This resulted in an inability to build partnerships for the future and the dwindling profitability and manufacturing capability of ASTAS.

The third homes in on the need to transform management practices. This was completed six months later. It shows the continued poor relationships and poor market intelligence resulting in ASTAS being unable to create a new strategic and operational capability.

## 2.5 SYSTEMS MODELS OF THE PROBLEM CONCERNS

Additionally a further process used in the formulation of the precise problem were the systems models. These were developed to show the interconnectedness of the key issues affecting ASTAS. Once again these have been developed over time

The first model (model 2.4) indicates that ASTAS's relevancy and capability will be fully tested as the changing environmental issues start taking effect. The second model (model 2.5) shows the need to look for new shareholders/partners together with a need to create a matching operational capability.

These systems models are helpful in arriving at the key issues that need to be addressed in solving the real problems.

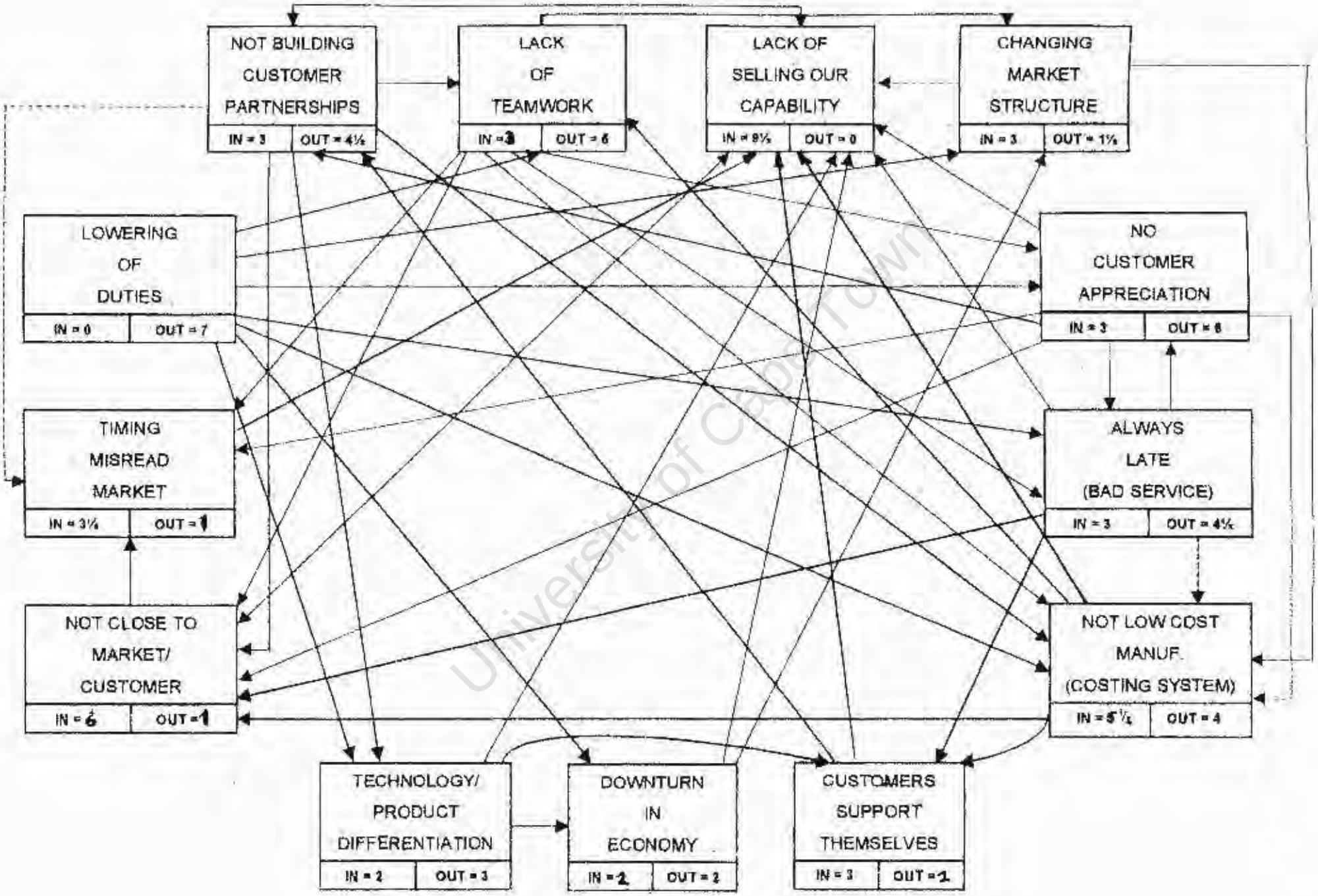
## 2.6 TOWARDS SOME ANSWERS

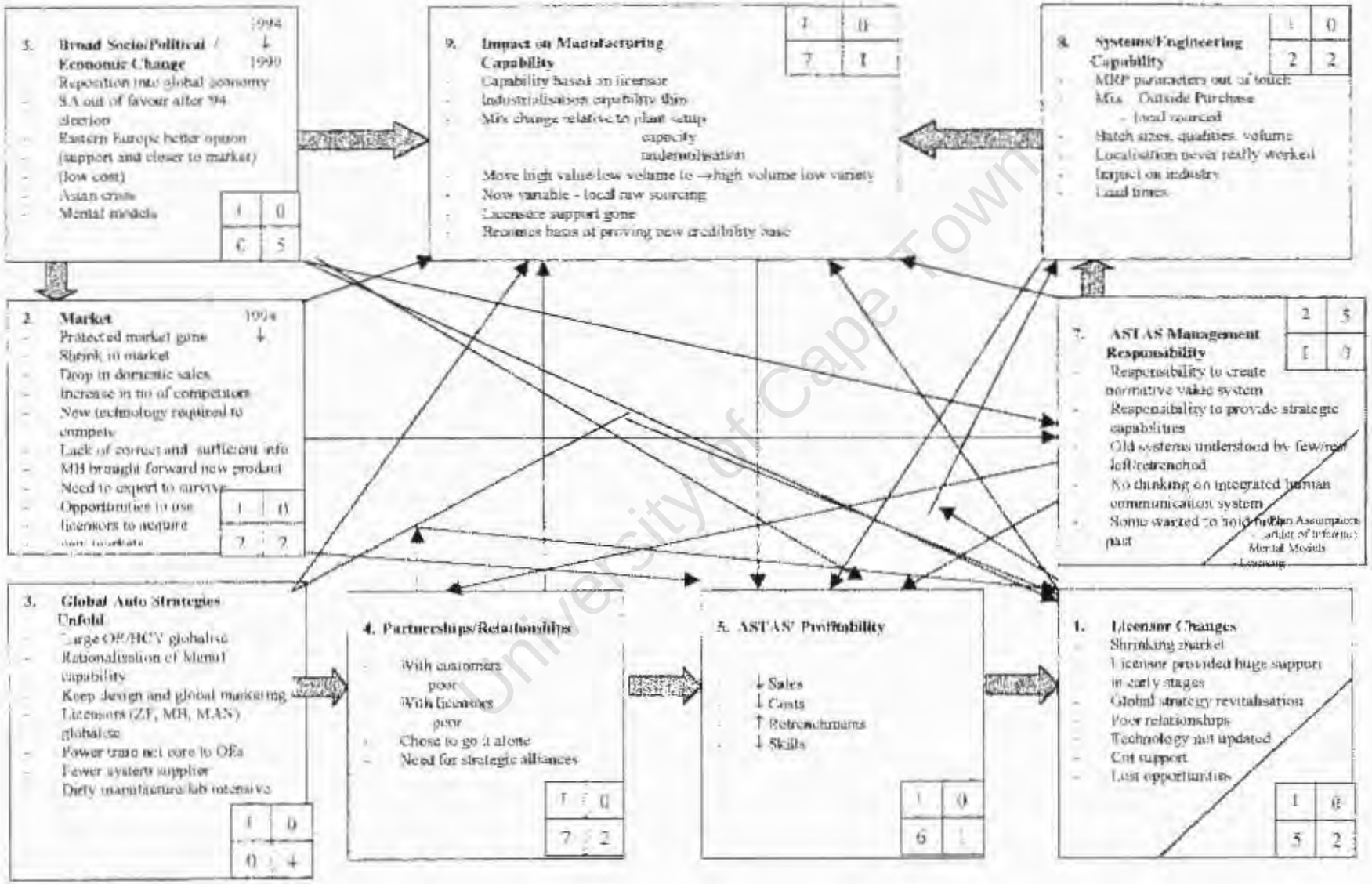
When the context changed dramatically, as it has done so in South African manufacturing (1990-1999), with so many fundamental and wide-ranging variables being affected, answers do not come from the past. The appropriate answers have to be significantly different, sometimes offbeat and what would seem philosophical, un-businesslike and certainly not South African

The major theme behind the answers is in their nature. They are process orientated and philosophical in nature. They are open-ended and dynamic. They combine strong philosophical theory with diligent researched practice

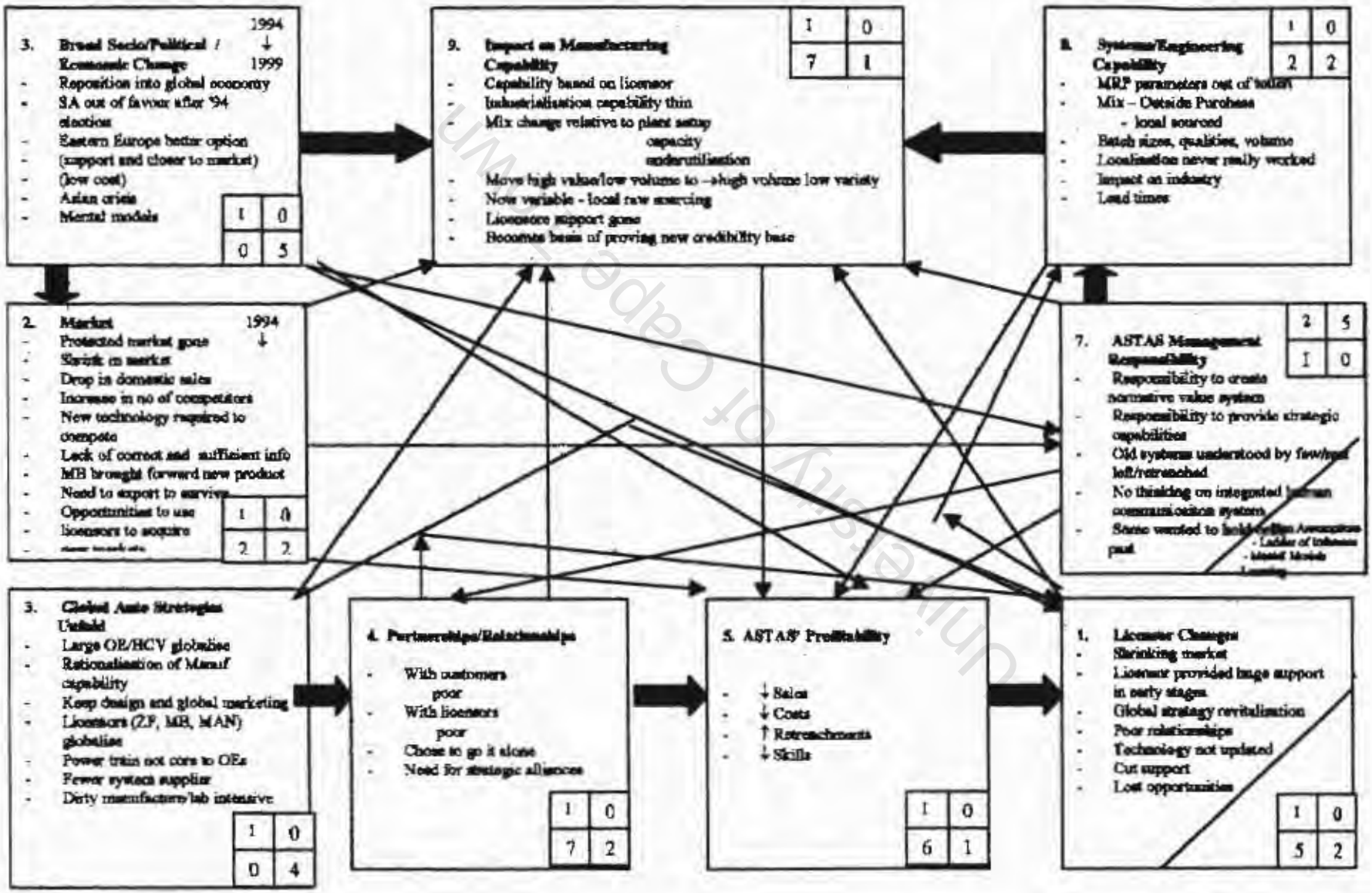
The answers encompass some of the following given below:

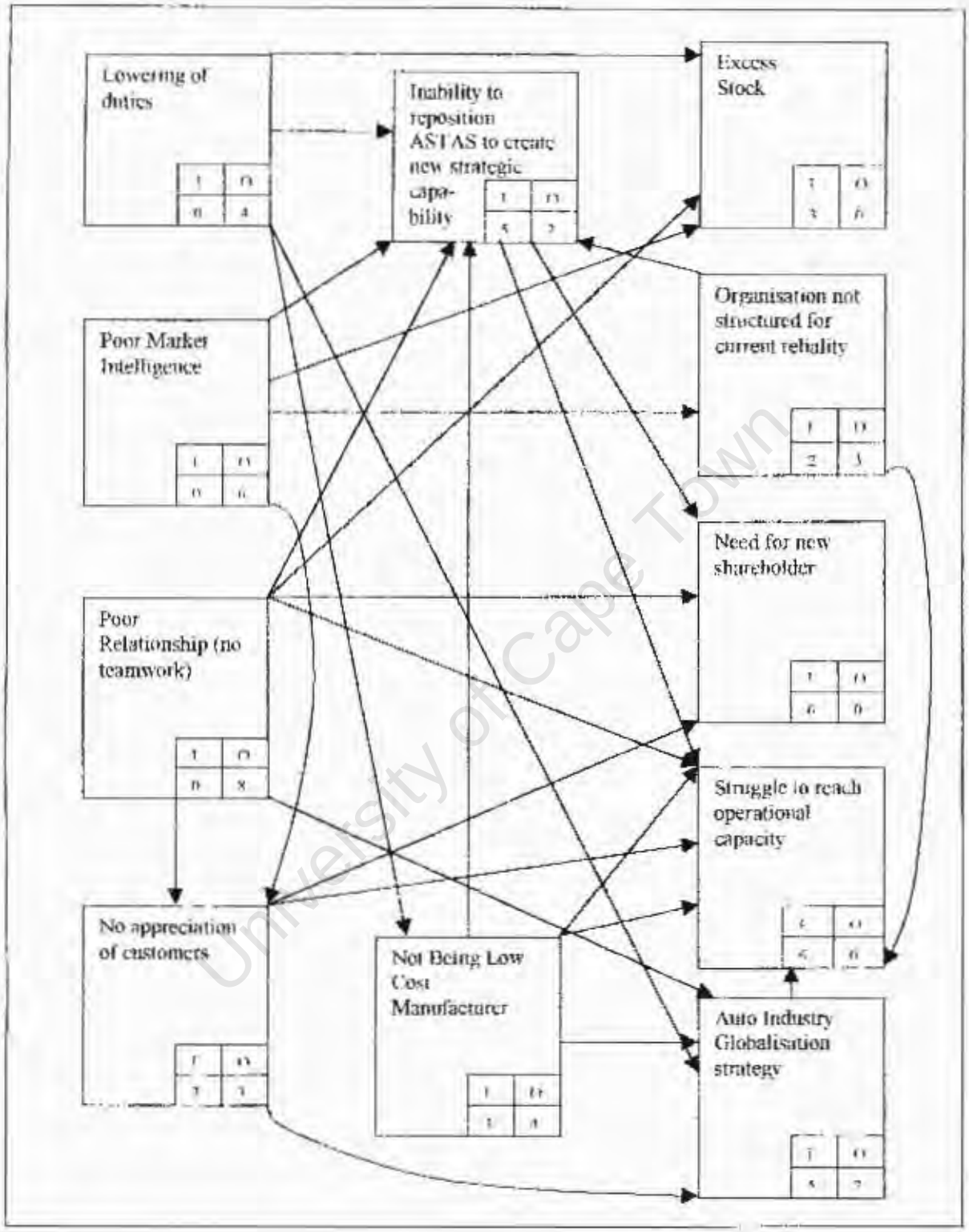
- the need to accept that change is happening fast and that learning has to happen faster than change to survive and grow
- the need to understand the learning process
- the need to use the scientific method and cybernetics for inquiry and learning



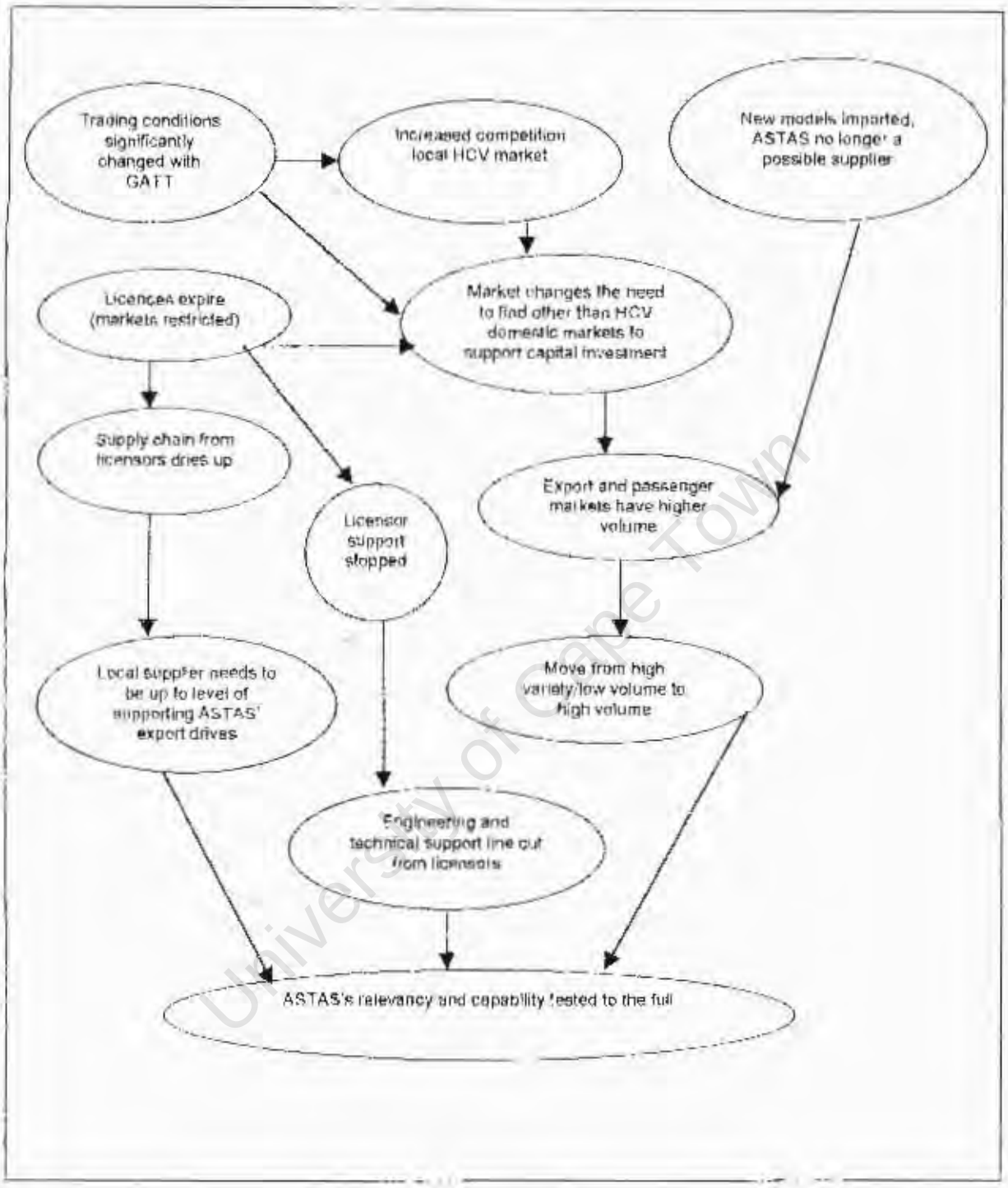



MODEL 2.2: Interrelationship Diagrap of Problem Situation

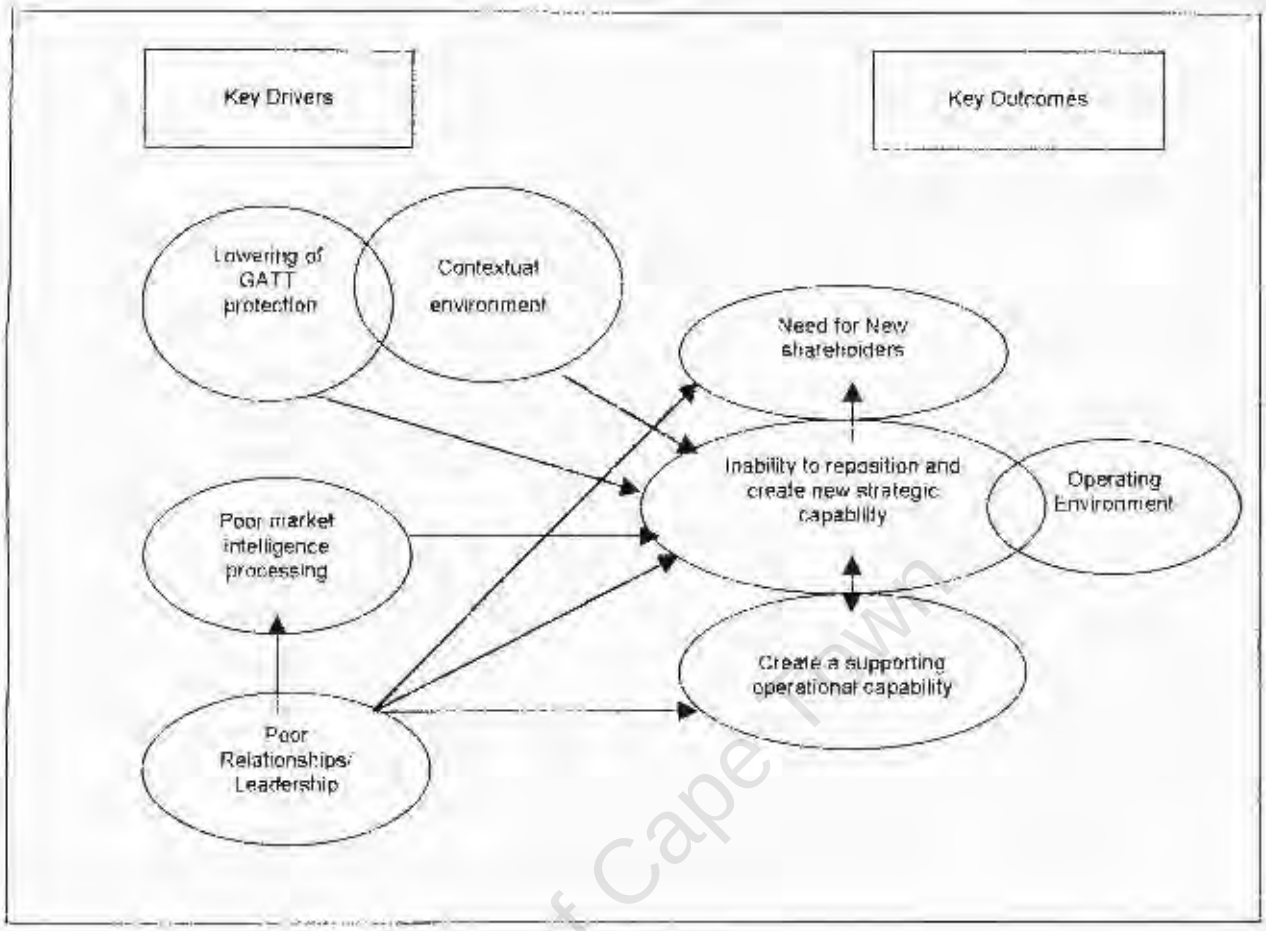





MODEL 2.3: Final Interrelationship Diagraph on Strategic Issues




MODEL 2.4: Systems Model of the Concerns




MODEL 2.5 : Systems Model on the Strategic Issues.



2.7.1.1 *Why Is It a Problem?*

Death of the manufacturing industry in South Africa is the alternative. Survival is the initial issue and becoming a vibrant global manufacturing contributor from South Africa to the global economy is the ultimate goal.

To stay abreast with the ever-changing variants at play both externally to manufacturing companies and internally to produce quality products, consistently at the market-determined price and to the global customers, expectations is a further reason why.

Manufacturing processes and methodologies need to be improved to match what the global economy requires.

### 2.7.2 How Can the Problem Be Solved?

- It requires a new philosophical framework for manufacturing management.
- It needs to step back and assess whether its mental models are appropriate and radically change them to suit the new context.
- It needs to learn—really learn in a questioning theory-based way—through a process of action in order to achieve new insights.
- It requires thinking systemically using multiple perceptions of inputs to enrich the orientations and information and assess the interrelationships.
- It needs a scientific method of inquiry, which after careful analysis in an ongoing way builds knowledge of the situation at hand.

### 2.7.3 What Is Missing?

Deming (1977: 17): "... an essential ingredient that I call profound knowledge is missing. There is no substitute for knowledge ..Hard work, best efforts and best intentions will not by themselves produce quality nor a market. Transformation of management is required—learning and application of profound knowledge."

Regarding the reacting of the external changes that affect the organisation, Deming (1977: 18) says: "It is management's responsibility to look ahead, predict, change the product, keep the plant in operation."

Deming, unfortunately due to the fact that he worked in Japan for so long and when he returned to America, was a voice in the wilderness to his own nation. Additionally his writings are not easily comprehended. Against this he has not been fully recognised for his wisdom that he rightfully deserves.

The problem has been very aptly described by Deming.

## 2.8 WHAT IS THE THEORY BEHIND THE PROBLEM?

Deming (1977:22): "The present style of management is the biggest producer of waste, causing huge losses whose magnitudes can not be evaluated, can not be measured." Deming provides a better set of management practices that are needed in transforming organisations. All these come from Deming (1977:24-35). These solutions form the backbone of his famous and often misunderstood '14 points'. See Appendix 3.

- A theory of management is required (involving theory and practice).
- Adopt and publish a constancy of purpose. Do some long-term planning. Ask the question: Where do we wish to be in five years from now? And then, by what method?
- Manage the whole company as a system. The function of every component, under good management, contributes toward optimisation of the system. Enlarge the boundaries of the system. The system must include the future. Make physical arrangements for informal dialogue between people in the various components of the company. Manage the components for optimisation of the aim of the system.
- Give everyone a chance to take pride in his or her work.
- Encourage continual learning and advancement.
- Work on a method for improvement of processes. Understand and improve the processes that produced the fault, defect, etc. Understand the distinction between common causes of variation and special causes, thus to understand the kind of action to take.
- Estimate the total cost of use of materials and services plus predict cost of problems in the use of them, and their effect on the quality of final product.
- Accountability for quality rests with the top management.

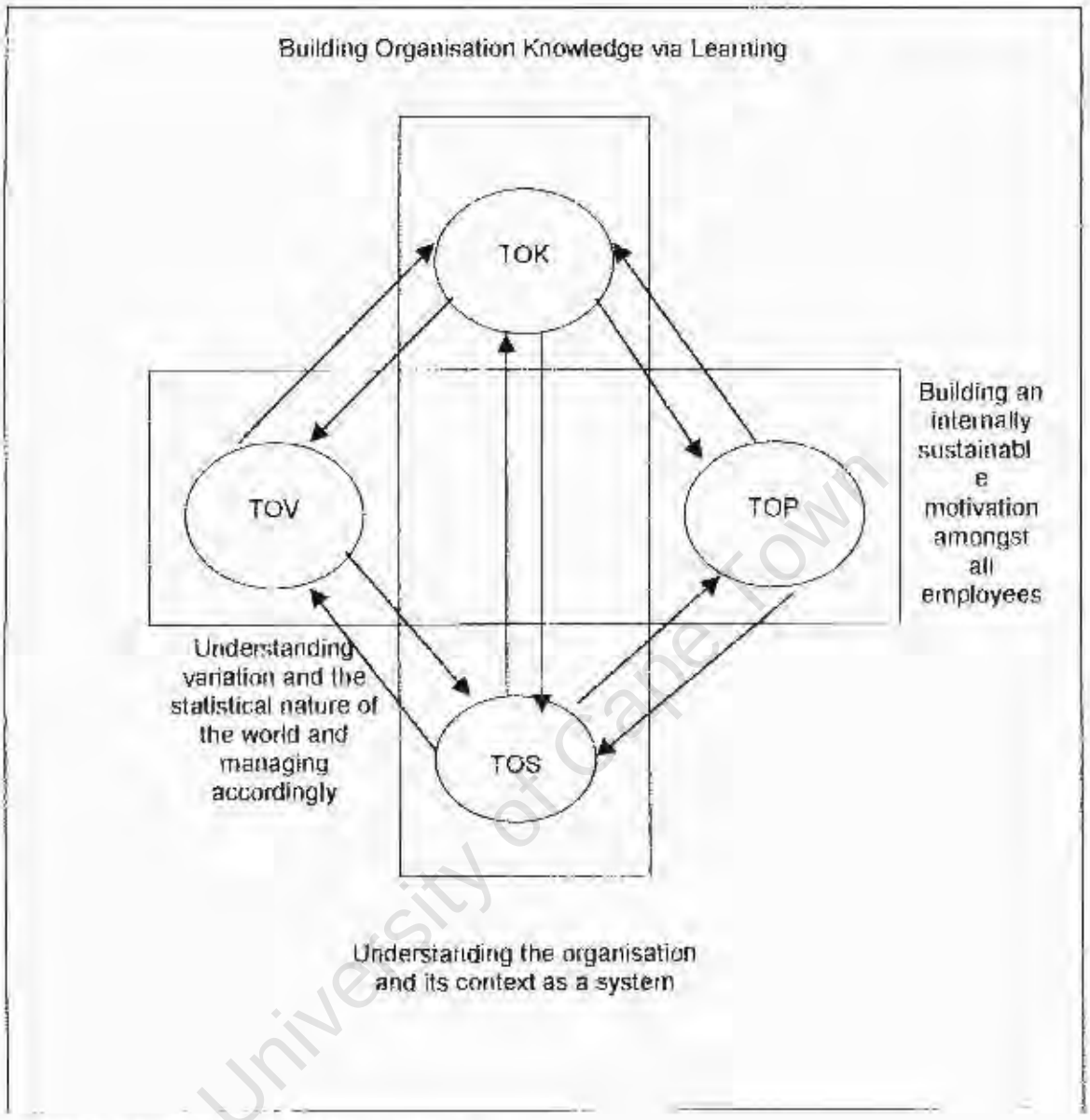
2.8.1 The Framework of the Transformation of Management

Deming (1982: 18): "There must be an awakening to the crisis, followed by action, management job... The transformation can only be accomplished by man, not by hardware. A Company can not buy its way into quality". Deming is very clear that there is a formula once adopted that can lead organisations into a future success.

Deming (1982: 19-20): "Theory of management now exists. There is now a theory of management for the improvement of quality, productivity, and the competitive position. No one can ever again claim that there is nothing in management to teach. Experience alone, without theory, teaches management nothing about what to do to improve quality and the competitive position, nor how to do it. If experience alone would be a teacher, then one may well ask why are we in this predicament? Experience will answer a question, and a question comes from theory. The theory in hand need not be elaborate. It may be only a hunch, or a statement of principles. It may turn out to be a wrong hunch."

Deming (1982: 21) "Support of top management is not sufficient. It is not enough that top management commit themselves for life to quality and productivity. They must know what it is that they are committed to—that is, what they must do. These obligations can not be delegated. Support is not enough: action is required."

The framework is called PSoK and is introduced in the next few pages.




MODEL 2.6: Model of PsoK Foundation

2.8.2 The Profound System of Knowledge

The system of profound knowledge provides a map of theory by which to understand the organisations that we work in. The prevailing management style, and the understanding and practices of management, must undergo transformation. The profound system of knowledge provides an external view of how this transformation can take place. The first step in this process

is that individuals and management are transformed in their understanding of the PSoK. They have to believe it and be disciples of it to others.

The four concepts are an appreciation for a system, the knowledge of variation, an understanding of the theory of knowledge, continuous learning and an understanding of psychology (the people aspect). Each will now be briefly discussed. Each element of the PsoK cannot be separated; they interact with each other. They are shown over the page in Model 2.6.

2.8.3 An Understanding of the Theory of Knowledge (TOK)

Management is about prediction. It is only when knowledge is genuinely gained that a claim to knowledge and predictions can be made. The scientific method and the process of learning in are important components to claiming knowledge each are covered in the next chapter. Continuous improvement, if it is to be achieved, has to be understood against the increase of knowledge.

A combination of using practice (experience) and building theory interacting with each other is the basis of the claim of knowledge.

We always think we know more than we do and sometimes doubt others' inputs. Only when using Peter Senge's model of the ladder of inference and the concepts of inquiry, advocacy and reflection as shown in model 3.5 can we ensure that we do not fall foul of the ignorant arrogance of others and ensure that each plausible input has been checked and therefore use it to make predictions.

A manager must in some ways be a better scientist than the laboratory worker.

The use of operational definitions will be discussed in 2.8.7. to ensure agreed upon concepts can be translated into useable experiments for action.

2.8.4 An Introduction to the Theory of Systems (TOS)

The theory of managing an organisation as a system or the network of interdependent components of an organisation, requiring communication and cooperation, working together to achieve a given aim is the basis of the theory of systems.

Some of the common problems in organisations is that one part works well at the expense of other parts. The connections between the parts of a system are often more than important than the parts themselves. The greater the interdependence between the parts the greater the need for communication and cooperation and hence the greater the need for overall management. The cooperation between the component parts is the responsibility of management. Some components may require to operate at a loss to themselves in order to optimise the whole system. Much coordination and negotiation is thus required to ensure systems goal realisation.

### 2.8.5 An Understanding of the Theory Psychology (TOP)

Purposeful human intervention that produces sustainable intrinsic motivation is what this section is about. There are a number of theorists and practitioners that have contributed in this area. Some believe that everything depends on people in organisations. Hence the ways to recognise the different hidden potential in people in the organisation and fully utilise the store of talent and knowledge that each person has, has to be managed

It helps to fully understand employees, their interactions with fellow employees, customers and suppliers alike. Employees learn and contribute in different ways. Most importantly it is imperative that the inner and intrinsic sources of motivation are unlocked so that employees can be managed towards the strategic and operational goals of the organisation. Good people management helps to nurture and preserve this. If employees are motivated then this can lead to coordinated effort in the organisation. The key to this is leadership and the need to transform managers to achieve an understanding of the theory of psychology

### 2.8.6 Theory of Variation (TOV)

It was Aristotle who first realised that with chance comes variability. Life is about variation. Everything varies and with variation comes uncertainty and in the business environment waste. The objective is to manage variation out. With the scientific method of management, information and data gathering and its analysis are necessary. Systems can be deemed to be stable when the distribution around the mean of outputs are predictable. Only when a process is stable and in control can it be defined as having capability.

There are two different sorts of variation in 'common cause variation'—which has a predictable pattern and 'special cause variation'—which is completely chaotic. Management and employees have to learn to manage each of these in different ways. When improved results are being striven for this is very important that adjustments are made correctly. When interfered with in the

wrong place, instead of improvement, disaster happens because of tampering a process that was not required.

The use and interpretation of data requires a good understanding of the scientific approach and of variation and why and when to make adjustments.

Once variation is understood its application to market information, manufacturing processes, management, production output, capability and a number of other issues fall into place.

### 2.8.7 Operational Meaning

In order to uphold the rigorous methodological approach it is important to define what we do. Deming was a strong believer in operational meaning and hence operational definitions.

A definition describes the essential characteristics of a thing or idea. The main purpose of definitions is to present meanings for clear understanding. Definitions attempt to prevent misunderstandings.

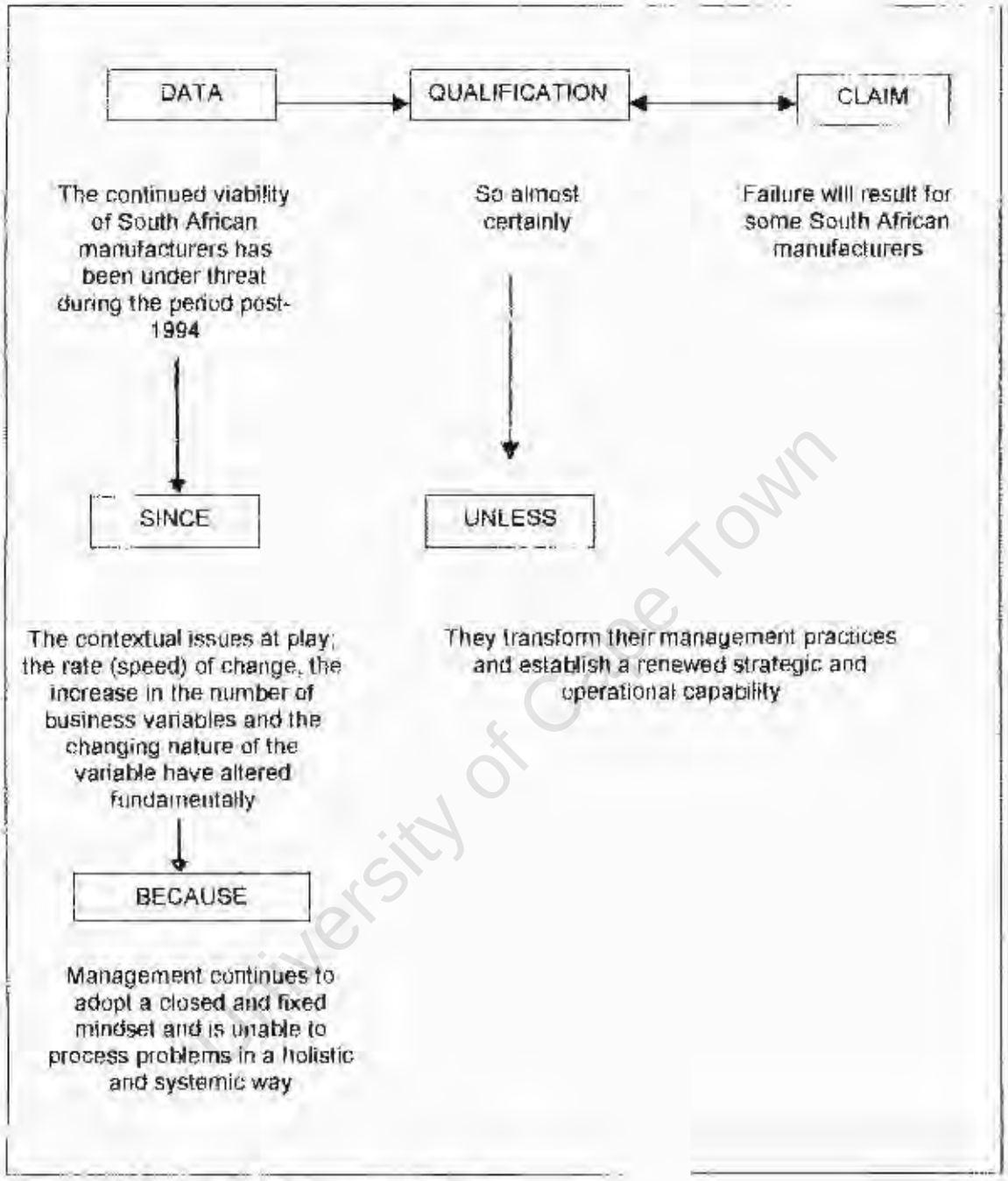
The operational definition is important in its usefulness. It gives the actions that the words symbolise and when performed give its meaning. The use of the operational definitions helps to clarify the playing field so that all mental models and frames of reference are orientated in the same direction.

Thus operational definitions ensure effective communication of concepts, assisting in achieving agreement and clarity. Operational definitions also improve stability and reduce variation. Going further, operational definitions assist in the formulation of a theory and in making learning easier. An explanation not expressed in operational terms as a prediction does not help us to learn, because it can never be proved wrong.

## 2.9 PROBLEM FORMULATION CLAIM

The concerns, questions and the sythesised issues through the interelationship diagraphs act as inputs. The PsoK provides the theoretical base. The systems models move towards an early output.

As a final outcome from the arguments discussed in the chapter the following claim is constructed in figure 2.7.




MODEL 2.7 The Problem Formulation Chain

## 2.10 CONCLUSION

Deming (1982:149) asks 'When?', 'How long?' The problem that has been described, and summarised as the need to transform management, is one that is allowed to slip into obscurity and mediocrity if not tackled. The Japanese successfully tackled it between 1950 and 1970 and eventually took on the world and America in particular. The Americans had to respond to the Japanese in the 1970s and 1980s with some success. The Europeans have now unified and as individual countries are now responding to their cost and management problems. South Africa's situation, although different, has many similarities. The theoretical model proposed by Deming in particular is required. But 'When?' and 'How Long?' need to be answered.

### 2.10.1 When?

Deming (1982: 150): "Only better management can bring the needed improvement. The big question is, how long will it be until top management become active in their responsibilities? And then how much longer will it take? Where is American industry headed? Restoration? Not restoration, but transformation. Solving problems and installation of gadgets is not the answer." Deming consistently believes that he summarised all the principles required into his 14 points. The more one looks at them the more one starts to believe them.

### 2.10.2 How Long?

Another question Deming asked was "How long [would it take to get started]?" Deming (1982: 151): "How long will it take to change the climate? To give to management a new outlook and a chance to adopt constancy of purpose ... A decade? Two? More like three."

Deming (1982: 153): "Let us reflect further. Even when the management of a company embarks in earnest on the 14 points for quality, productivity, and competitive position, advancement will at the best appear to be sluggish."

Deming believes that other points can happen quicker such as reducing of mass inspection, and the number of suppliers and not purchasing on price only. The removing of the inter-department barriers will take longer than five years in his opinion.

So back to the question, When? If you wish to survive you have no choice but to start now. The problem will not solve itself. Some organisations will survive, others will die.
This thesis is a contribution to that survival.

# CHAPTER THREE
# PHILOSOPHICAL THEORETICAL FOUNDATION - SYNTHESIS AND FRAMEWORK

## 3.1 INTRODUCTION

The context in which ASTAS operated in its South African and global external environment is covered in chapter 1. This is complemented with a synopsis of the issues and questions facing ASTAS during this time. The systems models of the problem as well as the problem argument are formulated at the end of chapter two.

The theories covered in this chapter are those provided during a Post-graduate Diploma in Industrial Administration. The philosophical foundation is Deming's Profound System of Knowledge (PSoK). This foundation is synthesised with appropriate content theories and an integrated research methodology.

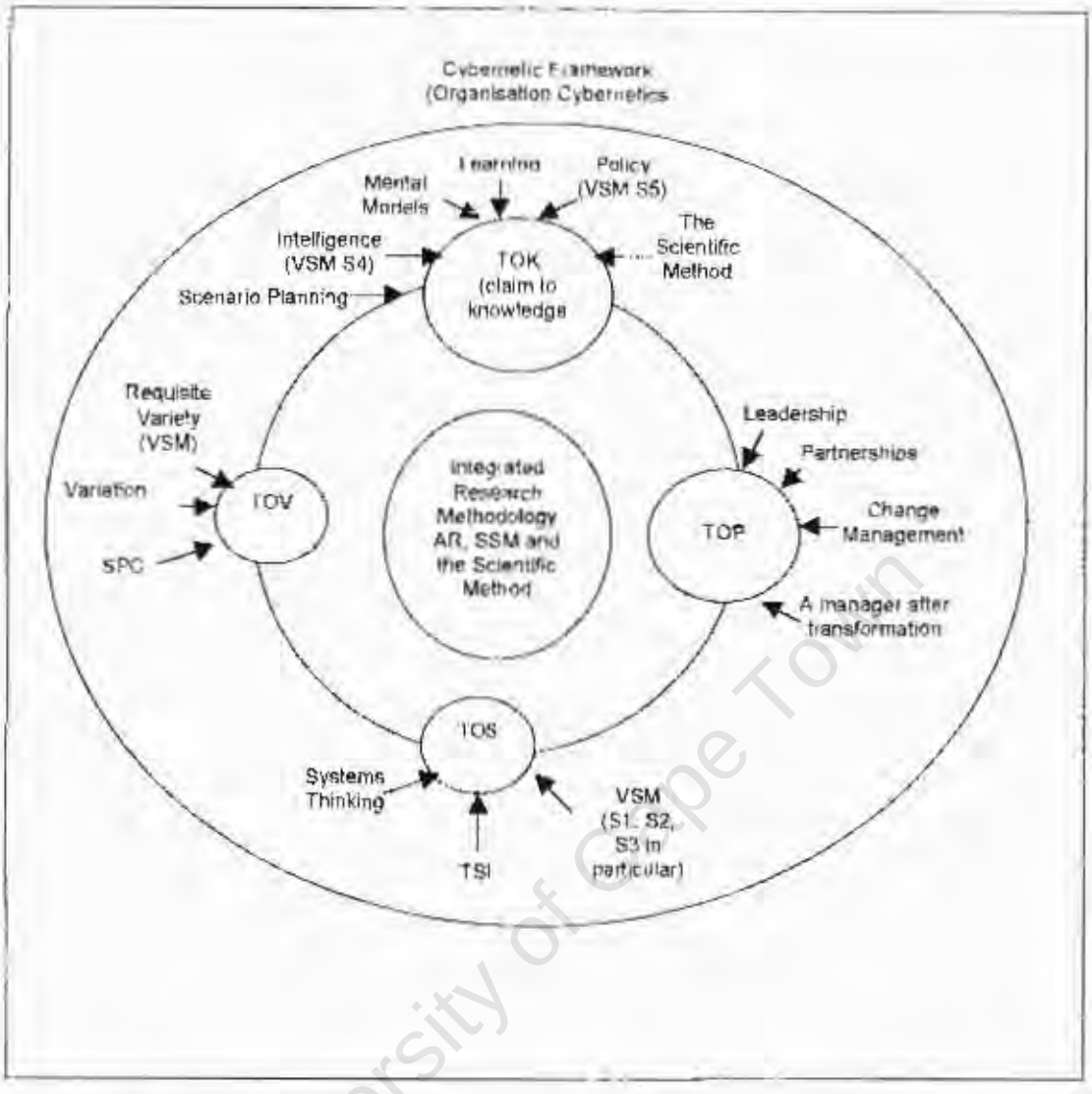
The outcome of the chapter is a philosophical synthesised theoretical manufacturing management framework overlaid with an integrated methodological approach. This gives impetus for planned action and implementation. The framework provides a model for thinking systemically towards an integrated, planned and coordinated set of implementations that can be statistically monitored together with participation by appropriate stakeholders. Thus allowing action so that learning as meaning (knowledge) is gained. The framework's focus is on the transformation of management practices to provide the ability to learn faster in a systemic way so as to provide both strategies and operational capability.

## 3.2 THE PHILOSOPHICAL THEORETICAL FRAMEWORK

With reference to the basic foundation Model 2.6 on page 32 and the Model 3.2 over the page the Deming Profound System of Knowledge comprising TOK, TOS, TOP, TOV is the foundation to the theoretical model. The model further adds other appropriate theories that complement the four legs.

The integrated research methodology is based on Action Research (AR) with soft systems methodology (SSM), and the scientific method synthesised in, and acts as the driver of the process.

The logical route of the theoretical inputs will be given in the following pages as a roadmap that can be referenced as one goes through the details.




MODEL 3.1: The Philosophical Framework to Transforming Management

The cybernetic framework provides a study of the practices of an organisation and a process of analysing complex systems (organisations). The VSM is a model of organisational cybernetics as formulated by Stafford Beer. Understanding the cybernetic characteristics, using the basic laws of cybernetics and using the cybernetic questions all assist management as a starting point to assessing the situation that they face.

The theory of knowledge starting point begins with the claim to knowledge and the principles of the scientific method as the recommended process to use to gain knowledge. Understanding mental models and how management opinions are made and the concept of learning, leading to

learning as a way of being are presented as a contribution to understanding the theory of knowledge.

Scenario planning as a way of rethinking the future for organisations is presented. Scenario planning covers the very basics of what Mitroff calls the fundamental questions facing an organisation covered on page 17. The important aspects of scenario planning covered are developing and articulating the business idea and the distinctive competencies of the organisation. It then assesses the competitive position against some optional scenarios leading to assessing strategic options towards reviewing the organisation's capability and business plans. The last two contributions to TOK are intelligence and policy. These are covered in the TOS section under the VSM S4 and S5 systems. It is the belief of the writer that they contribute to the TOK of the organisation.

The theory of systems involves analysing an organisation as a system amongst other interacting systems. The recursive nature of systems is covered in VSM. Systems thinking is a way of analysing the multitude of complex variables that create organisational problems. The Total Systems Intervention (TSI) proposed by Flood and Jackson gives a broad set of systems methodologies as a method of restructuring the company so that it deals with the complex world it operates in.

The theory of psychology is based on the need to achieve a leadership and employee group that has sustained commitment towards customers and quality. Senge's systemic leadership and Deming's manager role after transformation are important inputs. Inputs on managing change and partnerships are also given.

The theory of variation provides management with a process of managing variation. Variation is a natural product of any system and needs to be recognised, understood and managed. The concept of requisite variety in VSM at a conceptual level and SPC are methods of managing variety.

Lastly, the vehicle at the hub of the model suggested to drive this is an integrated research methodology process which combines AR, Soft Systems Methodology (SSM), Situation, Concerns,Questions, Answers, Review, Evaluation (SCQARE) and the scientific method.

This philosophical theoretical framework is needed to transform management given the context of large dynamic change.

## 3.3 ORGANISATIONAL CYBERNETICS

### 3.3.1 Introduction

Cybernetics according to Beer (1962) is "precisely about organisations". He continues "...for this is the medium through which control is exercised". The cybernetician studying the practices of management uses cybernetics for analysing complex systems.

Stafford Beer's early work in the Viable Systems Model (VSM) was one of the first models of organisational cybernetics used. His work, *The Heart of Enterprise* (1975), used cybernetics' first principles to build the VSM.

The use of the cybernetic laws and questions applied to organisations allowed organisational cybernetics to be fully understood. The role of the observer was given more attention as it was more fully utilised. Clemson (1984) took cybernetics to another level and what he calls second-order cybernetics, where studies of organisations in their complexity can be viewed and improvements made while observing the system.

### 3.3.2 Cybernetic Characteristics

According to Beer (1962) and as stated in Clemson (1984), when studying cybernetics the thinking is of a system with the following characteristics:

- Complexity—the system has more detail than the given observer can possibly cope with.
- Dynamic—the system is changing in behaviour or structure or both.
- Probabilistic—there are more elements in which behaviour is at least partly random.
- Integral—they act in some important sense as a unity.
- Open—they are embedded in an environment which affects them and which they affect.

Cybernetics is concerned with general patterns, laws and principles of behaviour that characterises complex, dynamic, probabilistic, integral and open systems. Factories, organisations and the human brain are examples of systems that are studied by cybernetics.

### 3.3.3 The Basic Law of Cybernetics

There are three cybernetic laws as identified by Clemson (1984).

**Law 1: Complex systems organise themselves**

As Clemson (1984) states: "the system is the way it is because of the mutual adjustments the parts have made in the process of interacting with each other."

**Law 2: Output of systems are dominated by feedback**

All outputs that are important to the system will have associated feedback loops.

**Law 3: The law of requisite variety**

Given a system and some regulator of that system the amount of regulation attainable is absolutely limited by the variety of the regulator.

### 3.3.4 Cybernetic Questions

An initial activity of a cybernetician, is the use of a set of cybernetic questions.

The cybernetic questions from Clemson (1984) are summarised below.

i. What is the system? Its relevant boundaries and environment.
ii. What is the real purpose of the system? What it actually does and what it is supposed to do.
iii. What are the constraints on the system? Its true constraints, its avoidable and unavoidable constraints. What can be done is to redefine the system and its environment.
iv. What is the language used for thinking about the system? Consider a meta language that removes problems.
v. How does the system work? What causes what? How do parts affect each other (the dynamics of the parts)? What observed results are available? What actual results are available?
vi. What are outputs of the system?
vii. What self-organising tendencies are there? Goals, values, aspirations, cultural norms, technical imperatives and feedback loops.

### 3.3.5. The Importance of Feedback Loops in Cybernetics

To explain feedback in cybernetics' terms it is important to distinguish between a negative and positive feedback loop.

Feedback in cybernetic terms can be explained by referring to causality whereby negative feedback refers to a situation where **A** causes an increase in **B** but **B** will cause a decrease in **A** and vice versa. Therefore any change in either will be related by the other. Negative feedback loops tend to be highly stable.

Positive feedback is when **A** causes **B** to change in the same direction and a change in **B** causes a similar change in **A**. Positive feedback loops are therefore very unstable.

Cybernetic causality, however, indicates that initial conditions may give different final conditions (positive feedback) and different initial conditions might give the same final result (negative feedback).

### 3.3.6. The Holistic Properties of Cybernetics

Many systems have certain characteristics, which belong to the system as a whole but do not belong to any of its parts. This can be described as **holistic** behaviour. It is therefore important to realise that each part can influence the other parts of the system.

### 3.3.7 Conclusion—How Can Management Use Cybernetics?

Organisational cybernetics is general in nature and is more about systems design than organisational structure. Organisational cybernetics can be used as a management practice. It is functional vertically and horizontally (as is shown in VSM) and its attention is given to simplifying the organisational complexity, while encouraging self-organisation so as to free up management's role to that of boundary management. Its focus is that of a command and control system.

It is a particularly good starting point in the design of information and market intelligence systems in organisations (law of requisite variety). It ensures the close interrelationship with the respective environments—both influencing them and being influenced by them. Organisational cybernetics maximises autonomy and therefore enhances the empowerment and development of the human potential in organisations. It assists organisations in decentralising control and through the autonomy increases viability and effectiveness.

Figure 3.2 integrates the various cybernetic factors and eludes to the VSM as a method of implementing organisational cybernetics.

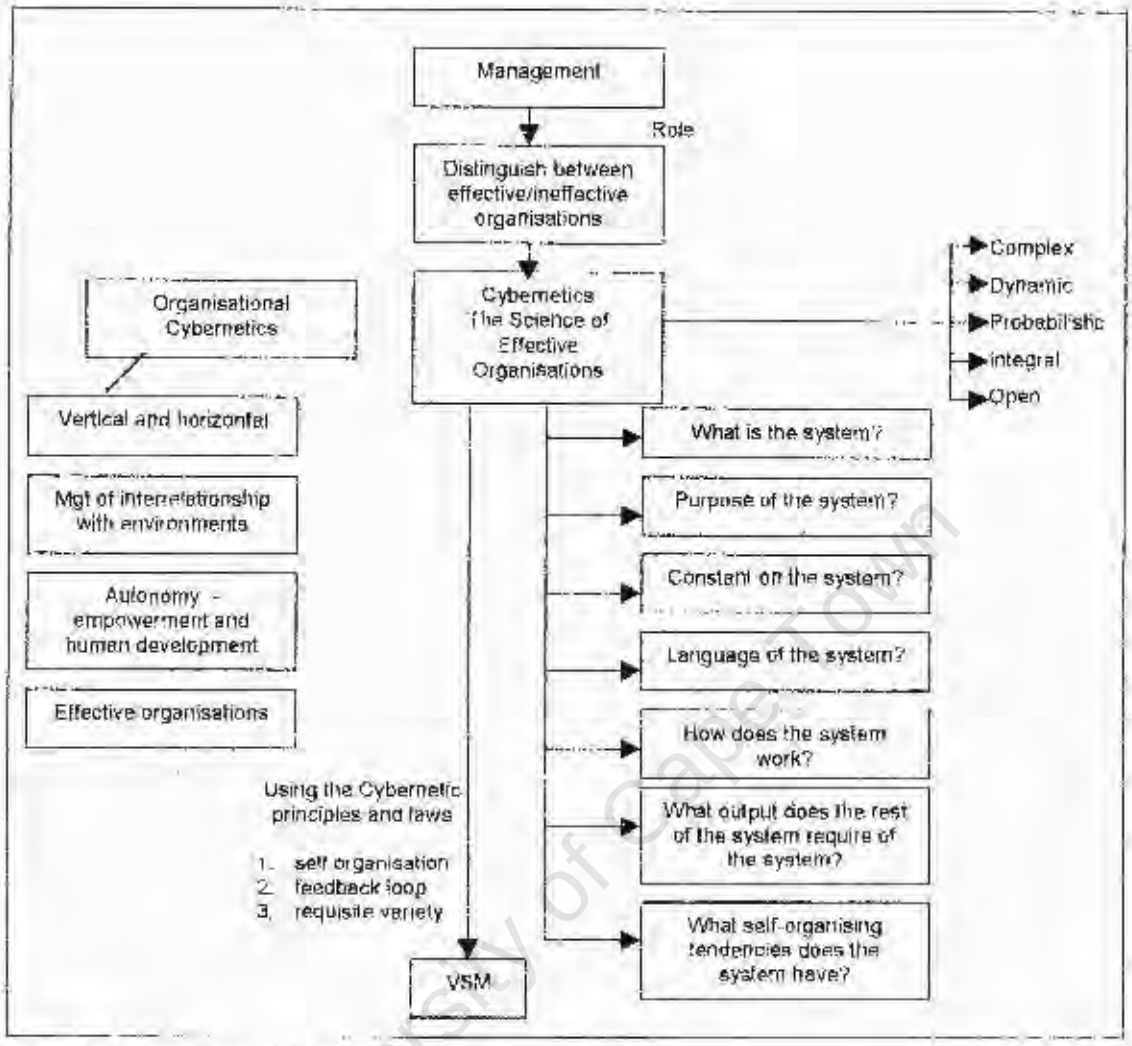



Figure 3.2: The Role of Cybernetics in Management



## 3.4 AN UNDERSTANDING OF THE THEORY OF KNOWLEDGE

### 3.4.1 Introduction

The theory of knowledge elaborates on the management responsibility of prediction. This prediction is based on knowledge that is built on theory. Theory is modeled on knowledge which in turn is built on theory with experience and therefore improves knowledge and prediction. With the complexity of managing organisations as systems and using the management of variation to bring the key factors into stable states it now remains to grow the knowledge of predicting the future, knowing when to act and when to wait.

An operational definition of the Theory of Knowledge is a theory that predicts, that by following its rules (a scientific approach), we will gain knowledge faster and more efficiently. It moves from things we can agree to, to things we can predict. It improves our ability to predict. There is no knowledge without prediction. The purpose of knowledge is action. It helps us to ask the right questions and which theories to test first.

The Theory of Knowledge is about dealing in philosophy. It is a study of how it is possible to increase one's understanding of a subject matter and to use this sensibly. The Theory of Knowledge is concerned with learning quickly and efficiently. The scientific method is the way this theory is applied and learnt quickly and efficiently. Managers have complex, dynamic systems to understand in the form of organisations.

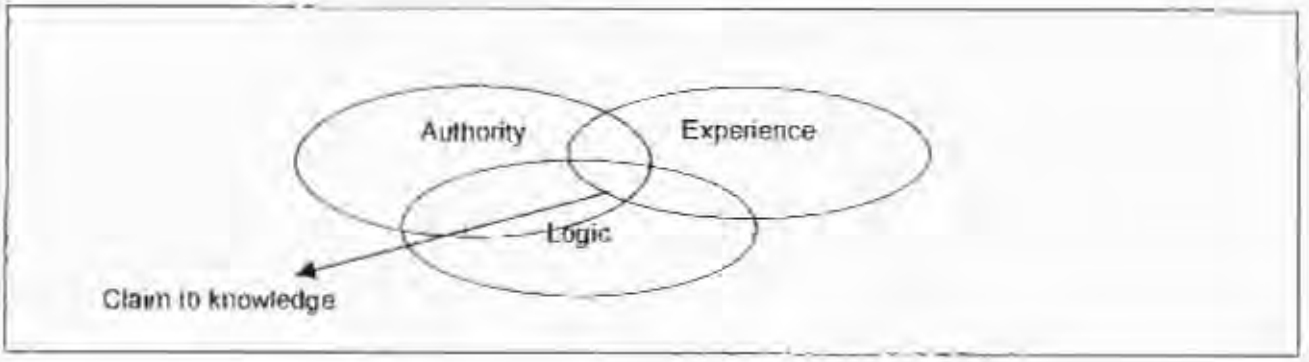
One's experience in observations and in building empirical data is important. It is when a theory is tested in practice that you learn from your experience. It is the practical man's way of gaining knowledge but should not be blind of theory. If things are changing quickly it has its limitations.

Theory is formulated from authoritative sources and great thinkers of the past. Good theory is based on recursions of experiences and should be easier to learn and explain over time. A scientific theory is a rule to predict the future; if it does it accurately it is a good theory.

### 3.4.2 The Claim to Knowledge

The discovery of new knowledge is based on three key elements that interact with each other. Additionally a methodology for verifying whether knowledge has been accrued through at least two different elements is required.

There are three main ways of deciding what is true about the world. The claim to knowledge is when the three sources of knowledge, your experience, authoritative writings and logical reasoning intersect. This claim to knowledge changes the way we think.




MODEL 3.3: Claim to Knowledge

- Authority

Authority comes from those who have already discovered and verified a subject matter for themselves and then documented it. They logically can be called authorities on the subject. Authority comes from being a good observer. If we cannot trust authority and it is questionable then one can use the other two ways of building knowledge. If the authority is built on structured experience, then the experience is given meaning which contributes to learning and knowledge.

- Experience

Experience comes from validating a theory claim through an applied experience. It is a very strong way of acquiring and verifying knowledge. Knowledge comes from turning experience into meaningful learning and knowledge. Good structured experiences where results validate the theory postulated contribute to knowledge.

- Logic

Conclusions supported by good logic are difficult to dispute. Logic is the tool that creates theory and provides the structure and meaning to our experiences. Logic puts power into theoretical statements: logic evaluates experience and authority claims. Logic evaluates what you already know. When rational facts are logically built then one can claim one's knowledge with a clear explanation. The logic helps us to see whether the theory is consistent, and clarifies questions

### 3.4.3 Principles of the Scientific Method

The scientific method as proposed by Revans (1977) is the preferred way of acquiring the knowledge as explained above. It provides the detailed basic theory of action using PSoK. The following nine steps to using the scientific method are given:

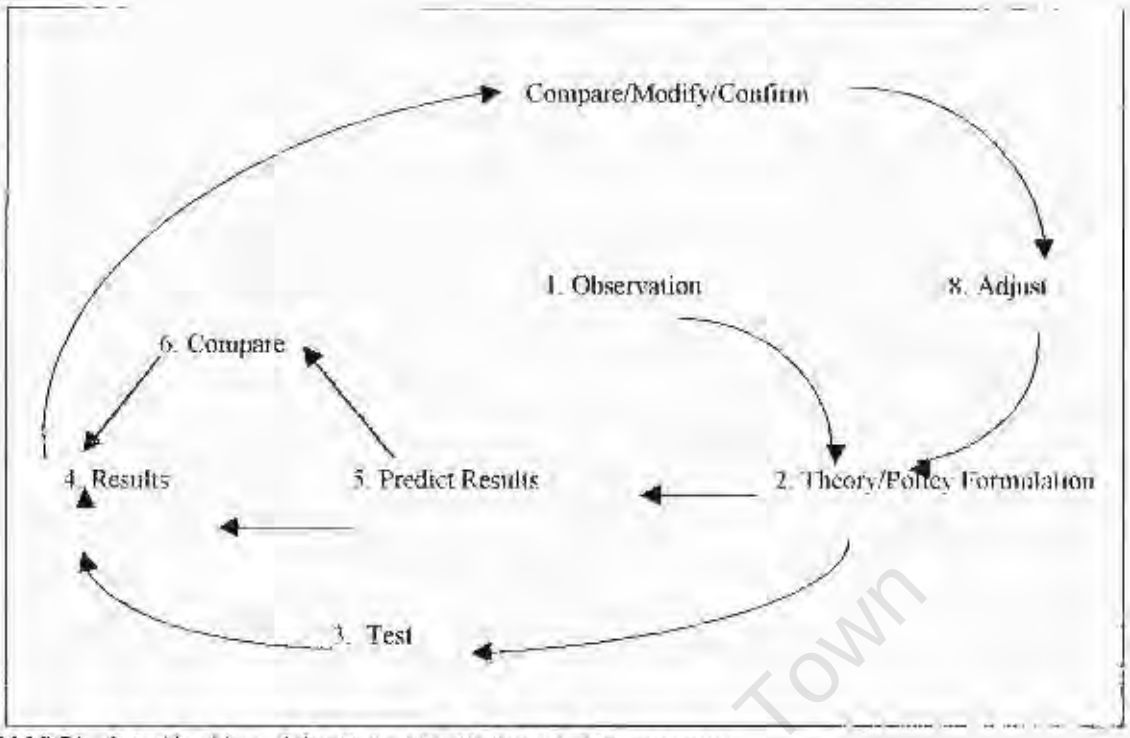
i. Understand the system and get it under control by reducing variability. Then one can make a prediction of the system.
ii. Blend previous experience and the prediction to formulate a clear theory.
iii. Agree on monitoring measures.
iv Do not ignore what you cannot measure.
v. Advocate and explain the theory to others.
vi Experiment in a small application.
vii. Using logic, begin to state claim to knowledge.
viii. Formulate, using gained statistics, the links between observation and prediction.
ix. Ignore certain factors as irrelevant.

The four principles that make the scientific method useful for making predictions:

i. Operational meaning has to be achieved when clarifying what it is to be predicted.
ii. Statistical methods and systems controls are to be used to improve the measurement process.
iii. The issue being predicted has to be under statistical control or stable.
iv. Using the operational measuring defines and tests the limits in which the prediction rules work.

### 3.4.4 Conclusion and how can management use the Theory of Knowledge practically

Management is all about prediction. The theory of knowledge and the scientific method provides management with the ability to predict. If you want to learn from experience and therefore gain knowledge then use the scientific method in recursive cycles of theory and practice. Ensure careful operational definitions are formulated, predictions postulated and agreed observations and measurements put in place. See the whole problem in systems terms in the context of the environment and stabilise the system by using statistical control checks.




MODEL 3.4: The Use of the Scientific Method in Management

Progress has to be made in small steps. The manufacturing process cannot be stopped and managers have to apply this to the situation at hand while it is operational. The system has to be working for experience and predictions to be made.

## 3.5 MANAGEMENT'S MENTAL MODELS

### 3.5.1 Introduction

One of the problems management has is the realisation that the fundamentals of management have changed and that new mental models are required to be formulated relative to the new circumstances and environment faced. Understanding how mental models are formed and held by the management team and the organisation is of extreme importance.

Mental models are the way we as individuals or organisations look at things. They come from our worldviews, value systems and life experiences. They are the mental representation of the situation we find ourselves in. They are formed by the way we gather information, what we assume, the reasons behind the conclusion we make and the mental processes of selection (of information), interpreting (assumptions), thinking (reasons), and believing (conclusions) that form the basis of our behaviour and actions.

Ballé (1994: 23) defines mental models as "...the stories that go through our minds...they reflect the beliefs we hold onto...that assist us in dealing with the complexities of the world we find ourselves in."

When working with other people, understanding one's own mental model and unearthing others is very helpful. It assists in teamwork and organisation cohesiveness. Building a common mental model makes for very good teamwork.
It goes further in that if the person/organisation is aware of the process that happens in forming and managing mental models then the management or influence of mental models that drives actions is or can be very powerfully utilised.

3.5.2. The Formation of Mental Models

Understanding how mental models are thus adjusted over time is a very important process. The person who has clarified this in much detail is Peter Senge in *The Fifth Discipline Fieldbook*.

Model 3.5. Shows how reflections, inquiry and advocacy is used in unlocking one's own mental models in understanding actions. Understanding the mental models and actions of others is a key skill required. It is important to note the linkages between inquiry and reflection.

Reflections are the processes of slowing down one's thinking and listening to oneself and taking stock of a situation, allowing time to think through one's own thoughts. This is connected to inquiry, which is where one shares one's thoughts with others or develops information regarding the ladders of inference of others. The inquiry process is balanced between asking (interviewing and clarifying) and generating (discussions and dialogues).

The other important linkage is between inquiry and advocacy. Advocacy is where one talks openly to others and tests one's ideas. One also reveals (sometimes to oneself but mainly to others) one's thinking processes. Advocacy is balanced between telling (explaining, testing out and asserting) and observing (sensing)

We are often taught to be assertive and advocacy is encouraged. However unless one has reflected inwardly and inquired from other people and other sources what one advocates might be hollow. Therefore it is important to use the steps in the ladder of inference, reflect and inquire and then advocate, and follow this process recursively. Additionally this process should be followed to unearth the mental models hidden in the minds of others.

Making one's mental models explicit and through inquiry and stepping down the ladders of inference of others assists in an organisational context in the process of building common mental models. Ballé (1994) argues: "If you put architecture to our thoughts and make them explicit we can allow an openness to the causality between our assumptions and our actions." All this is shown in Model 3.5.

The characteristics, general rules and building blocks are given in more detail in appendices 4, 5 and 6.

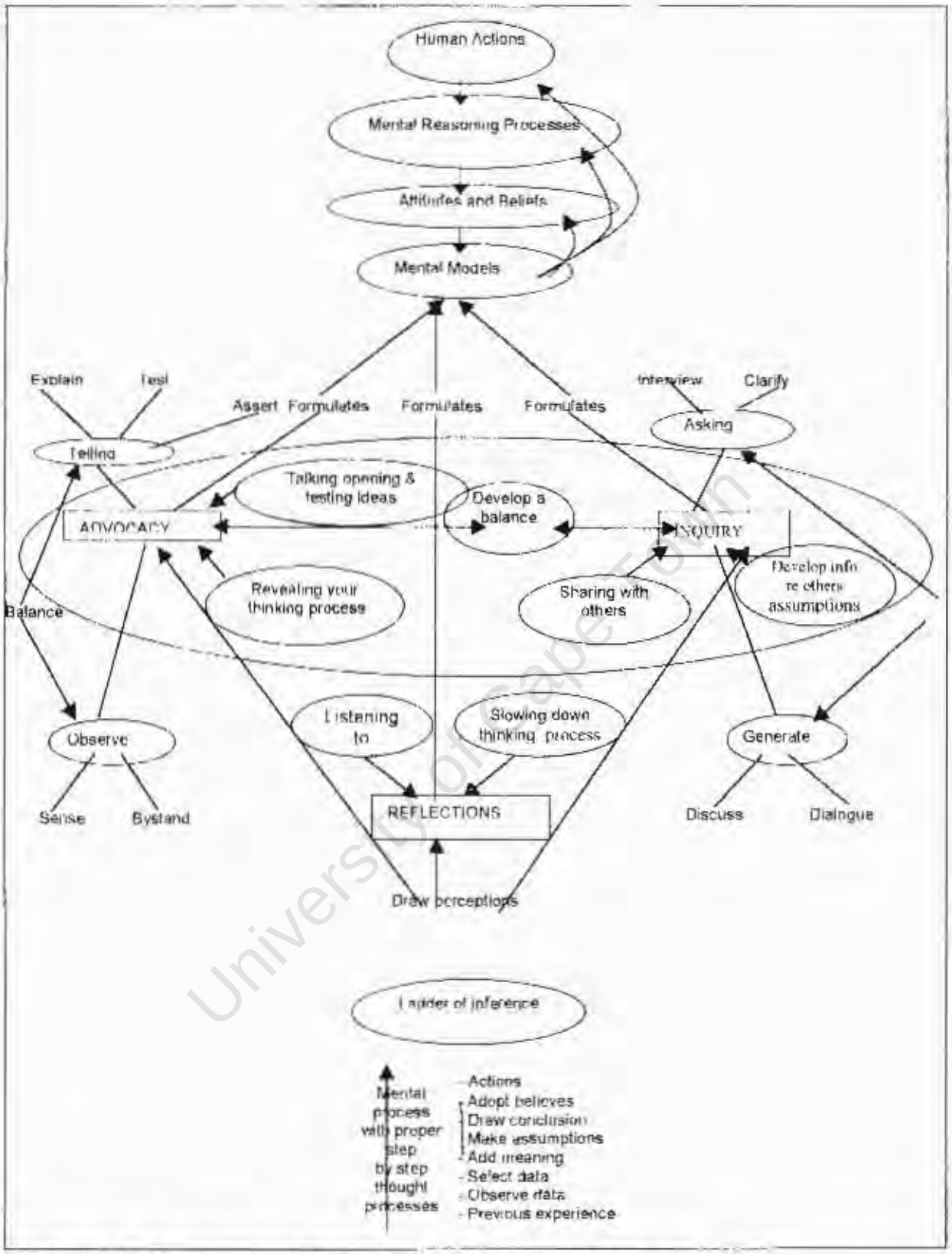
### 3.5.3 Conclusion

Argyris and Schoon (1974) say that: "...few people are aware that the maps they use to take action are **not** the theories they explicitly espouse." It is not simply the difference between what people say and what they do. It is the difference of two different theories of action, i.e. espoused theory (the world view and values people believe their behaviour is based on) and theory-in-use (the worldview and values implied by their behaviour, or the maps they use to take action).

When there are a multitude of variables in a situation as is often the case then simplification is necessary. Mental models provide this, where they describe the mind's eye of the beholder, the 20 per cent of the summarised situation which reflects the reality they see—interpreted by their perceptions. The 20 per cent summarised situation becomes the theory of describing the situation and is used as a model for driving action and behaviour, predicting future behaviour and anticipating others' behaviours.

There is a need to make one's mental model explicit through advocacy. As equally important it is necessity through inquiry to unearth the mental models of others. The reflective process of double-loop learning where the mental models are used to adjust and reframe is also required.

This process is as appropriate for individuals as it is for organisations where different managers and different employee groups formulate mental models of their situations.




MODEL 3.5 Advocacy, Inquiry, Reflections and the Ladder of Inference

## 3.6. LEARNING

Handy (1989: 44): "If you want to change, try learning... if you want to be in control of your change, take learning seriously."

### 3.6.1. Introduction

Learning as a process of dealing with change is probably the only way to stay alive. Ongoing change is a given and it is happening ever faster. Learning increases the probability of making good timeous decisions and learning reduces the definite risks that one faces with the flood of so much information available. Decisions have to be made even before all the facts are available.

In organisational terms this means that organisations have to learn effectively and use the acquired knowledge to make effective decisions. A person reaches competency through learning. So organisations, in turn, need to learn in order to survive and grow. This phenomenon is evident in nature where when a species goes against the rules of nature it runs the risk of becoming extinct.

Evidently learning becomes the mechanism to improve management practices of companies in dealing with change. A framework of learning has to be in place to conduct rigorous and continuous learning so as to improve viability and sustainability.

### 3.6.2. The Process of Learning

Handy (1989: 50) sums up this process by saying: "...learning is not finding out what other people know, but is solving our own problems for our own purposes, by questioning, thinking, and testing until the solution is a new part of our life."

Handy (1989: 47) describes the wheel of learning: "...the wheel starts with a question and until you follow all four steps and reach reflection then you have not learnt." Handy puts it succinctly (1989: 50): "...learning is measured by a growing experience, an experience understood and tested."

The reasoning process follows a circle that started with a question upon which certain theories are formulated, the theories are implemented and at one stage the theories or results must be reflected upon. After the reflection the next question is asked and the process repeats itself into a never-ending spiral of learning. This is shown in model 3.6.

### 3.6.3. Productive Reasoning

According to Handy the reasoning process for a learning organisation consists of productive reasoning that includes: hard data, a defined route of reasoning, testable outcomes and a rigorous attitude towards learning and change.

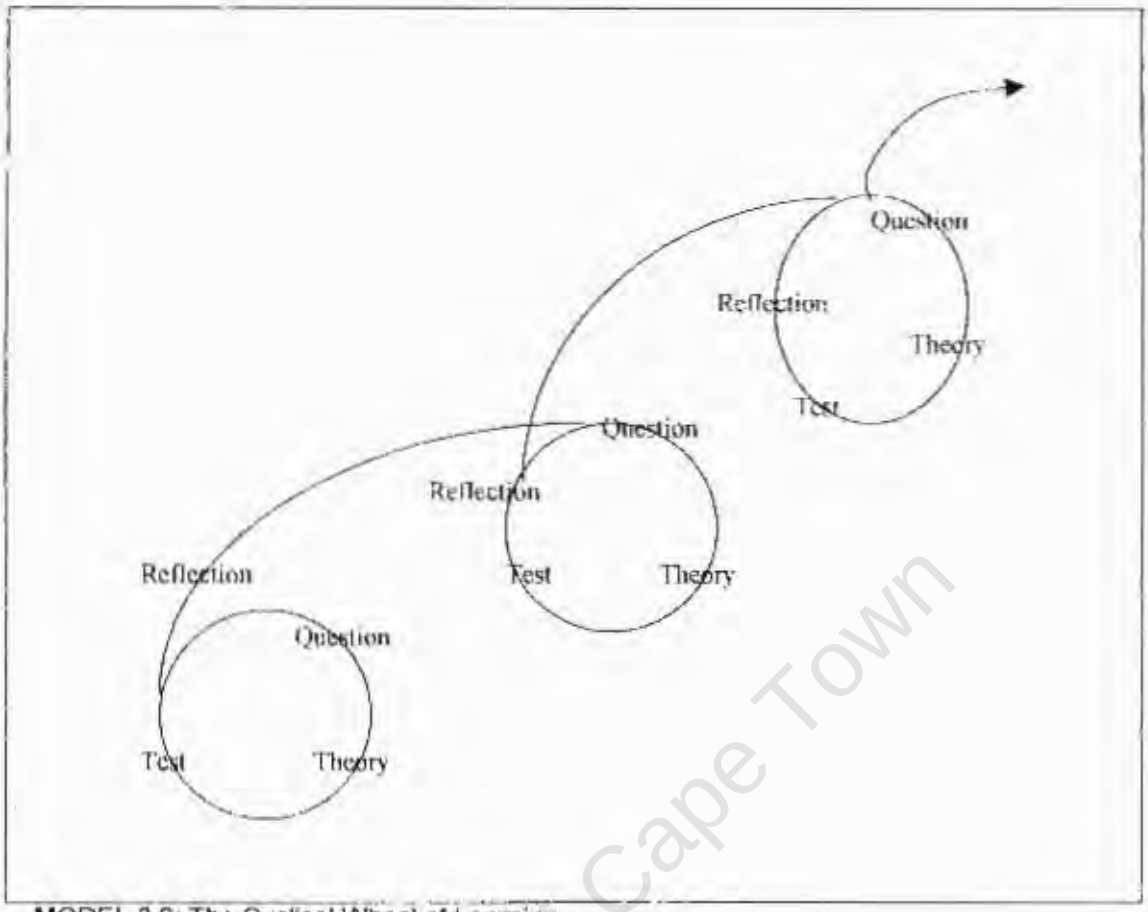
Argyris (1992) in support of Handy believes that the characteristics of productive reasoning are as follows: "Hard facts, explicit inferences, and explicit premises together with conclusions publicly advocated. He goes further and says that the above needs to be supported by explicit or tacit theory of strategic formulation, a set of directly interrelated concepts, a set of rules for using concepts to make permissible inferences, reach testable conclusions, and criteria to judge the validity of the test."

Productive reasoning is synonymous with the scientific method in management or a properly researched project to justify an investment. Companies in particular should move towards the productive reasoning approach to take out the effect that those with the loudest mouths using defensive reasoning carry the day.

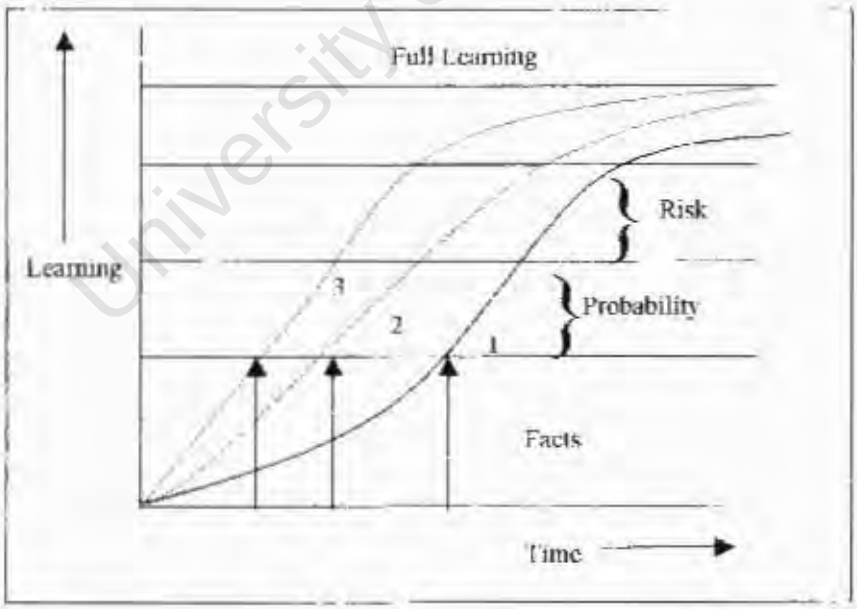
Argyris (1992): "When senior managers are trained in new reasoning skills, they can have a big impact on the performance of the entire organization—even when other employees are still reasoning defensively." The writer believes that unless this process of productive reasoning is utilised, too many organisations will continue to make poor decisions.

The issue of rigour and applying productive learning rigorously is important. Time and care are needed in designing the process, using hard facts, explicit inferences, publicly testable conclusions. The process needs to be followed step by step for it to be fruitful.

Using the productive reasoning process increases the basis of the facts and allows the learning to predict through probability to a higher level of learning and to reduce the risk implications. The real objective is to shift the curve as shown in figure 3.7 to the left from (1) to (2) to (3) so that the time to get to full learning and the risk is reduced.




MODEL 3.6: The Cyclical Wheel of Learning

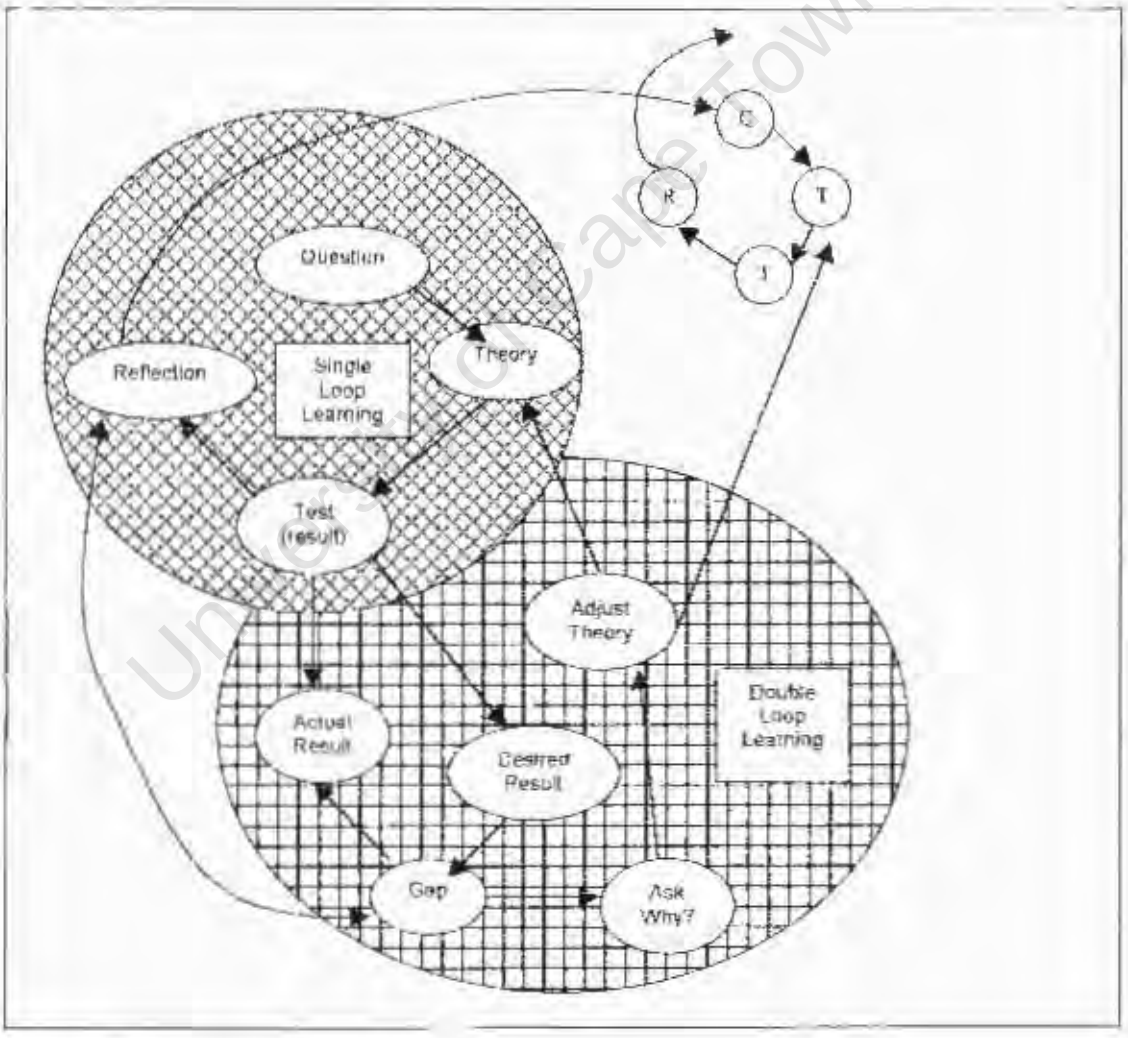



MODEL 3.7: Learning, Risk and Decision Making and Prediction

### 3.6.4. Double-loop Learning

The wheel of learning requires the wheel to turn the full circle from question through to reflection. A further process is required, called double-loop learning. On reflection the theoretical vs the actual result are evaluated to give the theory an adjustment, review, change or confirmation ahead of the next cycle of learning.

Thus the continual cyclical wheel of learning leads to life being a learning process from the very first question a child asks to the ongoing process of external learning. Learning is paramount for life and business today. The complex socio-technical, ever changing systems in which business operates begs the question that life cannot be lived without learning.




MODEL 3.8: Double-loop Learning

Learning must be a way of being—there must be no boundaries to the learning process in order to empower the individual or organisation to learn as quickly and as 'widely' as possible.

Boisot and Fiol (1987: 8) describe the process as follows. 'Any learning situation involves in some degree the acquisition of knowledge or its utilization; learning to learn can then be viewed as the ability to devise strategies for the acquisition of knowledge that are appropriate to the circumstances in which such learning is likely to be applied.'

Life-long learning is needed, real-time knowledge is required and an empowered learner is essential. Hence continuous change requires continuous learning.

This attitude and obviously practice of learning as a way of being has to be instilled in managers and organisations.

### 3.6.5 Conclusion—How Learning can assist Management

Learning is so important to staying ahead of change in a dynamically changing world. So too do organisations have to adapt to this. This starts with an inquiring management using the concepts such as the process of learning, the wheel of learning, adopting productive reasoning and using double-loop learning to reframe the mental model.

In an on-going changing environment the evolutionary/revolutionary process of learning is probably the only process that will allow one to survive and deal with the speed and variety of change in the modern world we live in. Action learning and the productive reasoning process of learning for both the individual and organisations is an important process to stay on top of the situation. Essentially learning has to become a way of being.

If effective learning is taking place for managers, then this effective learning implies effective management. The new context of management today requires the old paradigms and mental models of management to be abandoned. Management inquiry through the scientific method and learning is what is required. We have to rethink the future. The leader in business is required to create and foster customer, supplier and employee partnerships. Rigorous productive reasoning is needed to develop high performance processes.

Learning means change, and the resistance to change can be singled out as the major barrier because the person or organisation must actually give up the current situation and embark on a journey of unknown. The outcome will depend on the information used, and the mental model of

the major role-players. Learning has to happen at a greater rate than change. The alternative is a slow death.

It has already been contended that change requires learning. Learning helps to manage change and learning in fact needs change. However, it should be noted that learning has to be serious, continuous double-looped and habitual to be of any real use. Learning becomes the process of discovering about our organisations and ourselves in a changing environment.

Considering the changing environment that organisations operate in, it is essential to establish a learning organisation in order to remain competitive and stay in business.

## 3.7 SCENARIO PLANNING

### 3.7.1 Introduction

Scenario planning is the process that helps answer Mitroffs questions regarding what business we should be in and who our customers should be. It contributes to the theory of knowledge. Van der Heijden (1997) states that the premise to scenario planning is that there is an assumption that it is necessary for organisations to invest effort and resources into thinking about the organisation's future, and to develop some form of policy and strategy around this futuristic intent. Although this approach, in research, has led to better overall results, other reasons for embarking upon such an intervention include:

- up-front planning which promotes the need to not physically think through every crisis situation from the beginning, and the advantages are the time and resources required each time in the thinking process;
- adequate planning, which transforms the individual insights into organisational action;
- adequate planning, which lays the foundation for organisational learning. This then avoids the necessity to continually repeat errors made within the organisation.

### 3.7.2 An Overview of Scenario Planning

Van der Heijden (1997) provides the context to scenario planning by stating that there needs to be a differentiation between external and internal scenarios. External scenarios are derived from shared, and agreed upon, mental models of the external world. In essence it is beyond the control of the organisation and its management. Internal scenarios on the other hand, belong to individual persons, and relate to the anticipated future state of the world, as related to ourselves.

It is important to note that external scenarios function within the contextual environment.

For the organisation's aims to be achieved there should be a good fit with the environment. A strategy should be developed to guide individual behaviours toward this environmental fit. This should be based on:

- acknowledging the aims of the strategy
- assessing the organisation's characteristics, particularly its capacity to change
- assessing the future and current environments
- assessing the future and current fit
- developing policies and decisions to improve the fit

Scenario planning differs from traditional strategic planning in the sense that it includes ambiguity and uncertainty into the process of strategy. This avoids sporadic and once-off organisational activity, and forces the organisation into continual learning. As in the context of uncertainty, planning automatically becomes learning with this cycle never-ending.

This organisational learning involves the total system, and based upon empirical observation, the characteristics of the whole system become apparent as the organisation interacts with its environment.

### 3.7.3 Key Learning Points From Earlier Scenario Planning Attempts

As scenario analysis moves from the predicted and control components, scenario planning itself moves away from probability towards causal thinking. In this regard, several key learning points can be gleaned from the Shell experience. These include:

- People are forced to think about the future, rather than using forecasting techniques.
- People are also forced to be more perceptive, recognise events for what they are and how they form part of a pattern, and thereby understand the consequences and implications.
- Senior management should not initially direct instructions, but rather use the scenarios to set the context for decision making at lower levels.
- Scenarios can be used to provide leadership for the organisation.

### 3.7.4 The Theoretical Steps of Scenario Planning

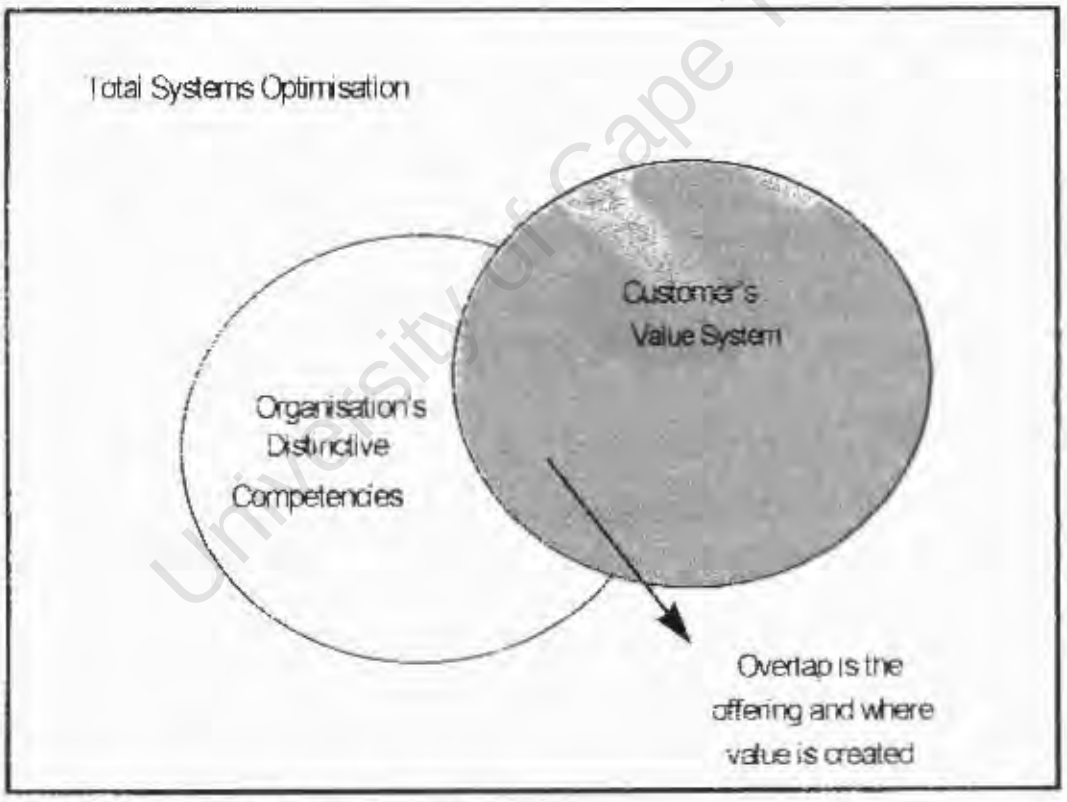
In the Model 3.9 the process steps of scenario planning are given. The key areas of these steps will be dealt with in more detail, the first being the developing of the BI of the organisation.

The concept of the business idea is based upon a total system optimisation. This can be depicted as shown in model 3.9:

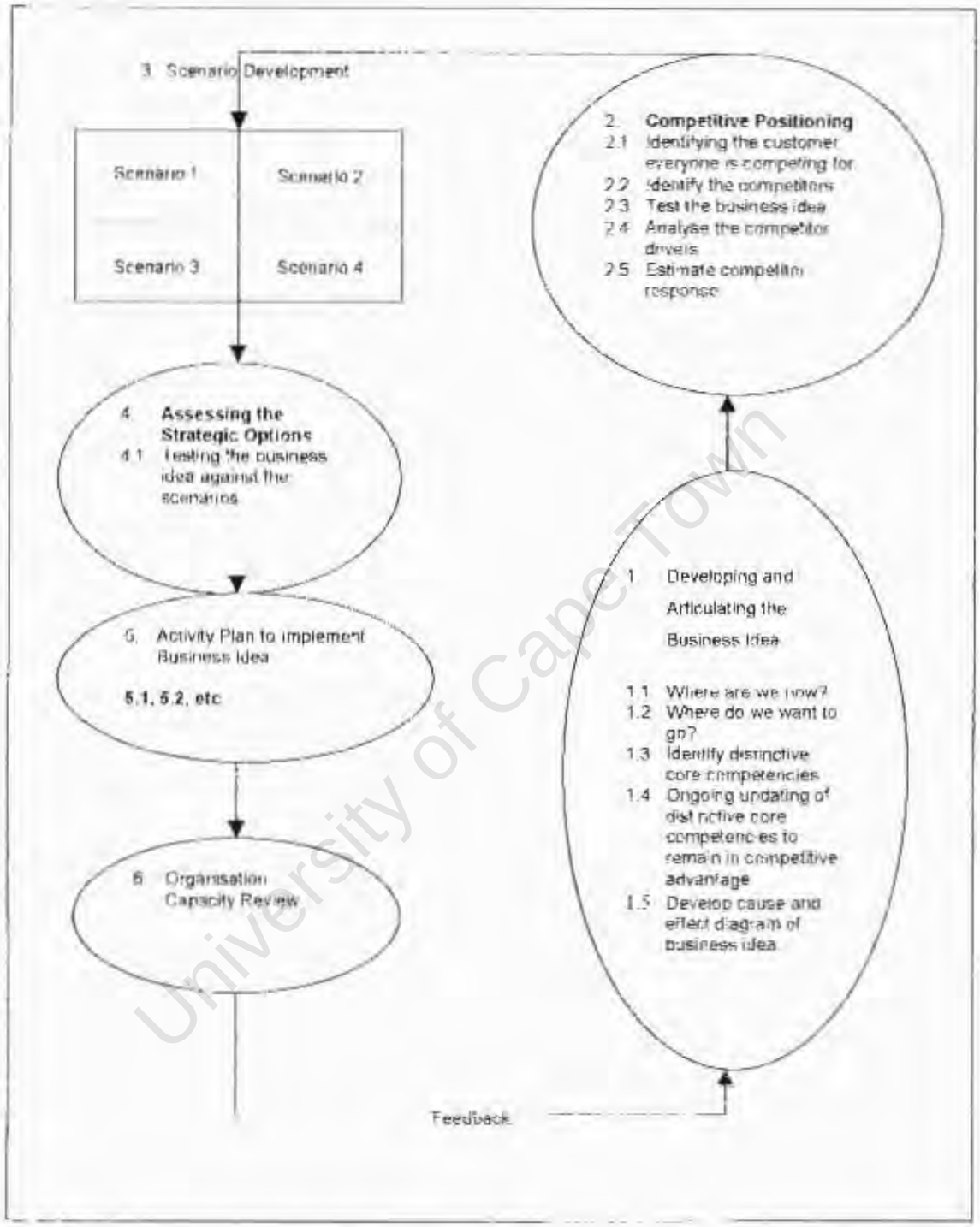
To create value, the organisation needs to create a surplus for stakeholders for the future. Strategy development is therefore needed. Van der Heijden (1997) refers to this as profit potential, which is not the same as profit. Van der Heijden believes this is attained by:

- discovering new ways of creating value for customers;
- collating different organisational distinctive competencies which create this value.

The central overlap area, termed the offering is the mechanism by which the seller and customer systems are linked together to exploit the supplier competencies in the customer value system.




MODEL 3.9: Total System Optimisation




MODEL 3.10 - The Theoretical Steps of Scenario Planning

### 3.7.5 The Business Idea (BI)

The BI is the organisation's mental model of the forces behind its current and future success (van der Heijden [1997]). The business idea should be a rational explanation of why the organisation has been successful in the past, and what will make it succeed in the future. This is based on the principle of profit potential or the surplus to the shareholders. It is important to note that stakeholders comprise of shareholders, who require a return on their investment, employees who can exploit their personal strengths, and customers who want to feel that they have received better value for money than they would have received from an alternate organisation.

Customer power is determined by the alternatives open to them. If there are no alternatives open to customers then customers have no power. It is therefore important to note that in this case the organisation will share a larger portion of the value. With global competition, it will not be long before a company needs to improve on its product or service. The customer will then have the majority of the power, and therefore will appropriate the majority of the value.

A business idea that has worth must also have rigour, in that if a competitive advantage is pounced upon, then the product and service should be continually improved upon to keep the customers satisfied.

The BI must be reviewed regularly, and all changes within the organisational operating environment must be monitored, and the business idea amended accordingly. What would have happened to the Ford Empire, if the business idea had remained rigid that the only colour for a motor car was black? (See Appendices 7 and 8 for more detail)

### 3.7.6 Distinctive Competencies

For an organisation to embark on the road of setting up a business idea that will take them into the future they must first establish 'where they are now' and what can they do in the future to become better. A business idea is a strategic map of the organisation's survival.

The first step in establishing 'where we are now' or 'where do we want to go', is to establish, 'what we do well'. Identifying the organisations core competencies, the things that they are good at, does this. Doing a strengths, weaknesses, opportunities and threats (SWOT) analysis usually starts this exercise. The SWOT analysis is best performed in two legs. Firstly the management team conducts a brainstorming session, identifying the strengths, weaknesses, opportunities and threats facing the organisation. The second leg is to interview staff employees, and through

strategic conversation with the employees identify their understanding of the company's strengths, weaknesses, opportunities and threats facing the organisation.

Internal personnel or consultants can conduct this part. There is often a deep understanding of the organisation that can be gained from the employees if the right questions are asked, in an environment conducive to honest answers. The results of the two exercises are then combined to establish the company's core competencies. Distinctive core competencies are competencies that cannot be, or are extremely difficult to be emulated by competitors.

The uniqueness can then be derived from the distinctive competencies or from a combination of these. Distinctive core competencies are competencies that cannot be, or are extremely difficult, to be emulated by competitors.

### 3.7.7 Competitive Advantage

If the business idea and its distinctive competencies are effective, this creates a competitive advantage. It therefore follows that: distinctive competencies are used to create a differentiated product, of which the competition cannot easily match, and for which the customer is prepared to pay a superior price; or the distinctive competencies are used to create a low cost non-differentiated product. Therefore customers are attracted either by superior product or by low cost pricing, but either way it must be distinct.

A product that is distinguished in its characteristics from others on the market, in a way that results in additional customer value enjoys a competitive advantage. If competitors cannot match the distinctive element, part of the additional customer value can be appropriated to the organisation.

However distinctive competencies depreciate over time. Business is fundamentally dynamic, change is an essential part of organisational life. In an evolving world survival implies continuous updating of the organisation's business idea. As a consequence a business idea is not valid forever. It needs to be kept up to date. Existing distinctive competencies need to be strengthened, and new ones created.

### 3.7.8 Feedback Loops (Continuous Relevance)

Once developed, the business idea requires continual feedback in the form of positive and negative feedback loops. Feedback is required from positive loops. Early feedback from the environment and how the business arena is changing is required. These are positive feedback

loops. Negative feedback is required regarding the internal organisation and changing customer expectations. If the business idea is not clearly understood by all employees and management then there is a strong possibility that the feedback loops will slip unnoticed, with the result that the company will lose touch with its own environment and the customers. This is a strong recipe for disaster.

Entrepreneurial invention continues to be a prerequisite for survival and success. The concept of the business idea puts entrepreneurial invention back on the agenda. This must be thought about in an uncertain future. The risks must be calculated. The business idea is the first step.

The more this can be done systemically, the stronger the business idea. The business idea and its distinctive competencies if effective, will create competitive advantage.

The nine-step process of articulating the business idea and a method of institutionalising scenario planning as learning using scenario workshops is given in Appendices 9-12.

3.7.9 How Can Management Use Scenario Planning—Conclusion.

What can management do to develop a level of sophistication in analysing, thinking, planning and learning about its environment and internal capacity building so that a culture of scenario planning and learning will dynamically maximise the overlap of the customers value requirements and the seller's (organisation's) competencies? Continuing with the formal scenario planning process this will lead to improvements in better marketing, and investments in technology. If continuous development of the BI and the distinctive competencies are undertaken then sustainability will be achieved. Additionally if planned events and monitoring is undertaken then it will become a culture.

Today many organisations operate in the context of a global, dynamic business environment. Organisations that are aware of and adaptable to the changes required from outside or within have the chance of survival. Therefore organisations require the following:

- an alertness to the changing business conditions and a capability of reading signals early
- an ability to read the trends in the outside environment
- a sense of the future opportunities rather than the fear of threats of failure
- a business idea that is strongly formulated with key driving forces and is kept current
- a few key future scenarios that are prioritised and consistently assessed

- seven to ten distinctive competencies that are reviewed and added to, to stay valid in the eyes of the customer
- an awareness of the key competitive advantages and possible moves and countermoves of the competitors
- internal capabilities that are grown, supported and developed to give weight to the effectiveness of the BI.

To end off a quote that is highly relevant: "The ability to learn faster than your competitors may be the only sustainable advantage." Arie de Geus, (1988).

## 3.8 THEORY OF SYSTEMS

### 3.8.1 Introduction

The earlier introduction to the TOK in 2.8.4., focuses on the Deming approach. Further theories are put forward to supplement this. Systems thinking is a useful method of analysing a multitude of variables and complexity so as to formulate improved models for action and application. Its basic premise is a transformation process with inputs and outputs. Systems thinking is recursive, taking into account the broader environment of a system, and that there are systems interacting with other systems. Systems thinking assists in designing management systems.

In practice and in predicting systems behaviour, systems thinking helps to keep one in touch with the big picture at the levels that influence the situation one is in.

Through systems thinking complex problems and situations can be understood easier and new subjects can be learned with greater ease because a connection can be made between what is already known and the unknown.

Throughout literature it is clear that everything and everyone is interrelated and a network of systems exist which might appear to be very complex but can be understood through systems thinking. As Kaufman (1985: 11) says: "Surprisingly there is a way—and a fairly easy way—to learn how to deal with the world around us in all its complexity without being some kind of mental superman. The answer is an approach we call 'systems thinking'..."

By considering an organisation as a system, and by considering why some organisations have better ability to adapt than others, it is clear that the organisation that keeps in touch with the constant change in its environment is more likely to adapt to change without serious consequences. As De Geus (1988: 71) says: "The challenge therefore is to recognise and react

to environmental change before the pain of the crises." in other words 'painful crises' considering the outside environment can, largely prevent i.e. take-over or take-over threats, etc. By considering the outside environment, the system can also grow in potential. An organisation with knowledge of itself and its environment can, for example, broaden its production range and still use the same resources.

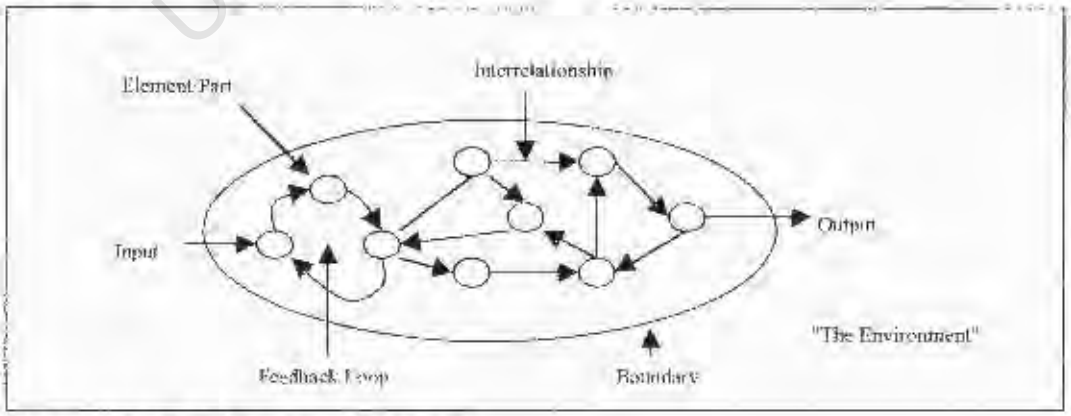
3.8.2 The Concept of a System

Kauffman (1985: 1) defines it as "...a collection of parts which interact with each other to function as a whole." In addition one should consider the rules or characteristics of a system:

- Each part can influence the output of the system.
- This influence will be dependent on the interaction with other parts of the system.
- If a system is taken apart, it loses its defining characteristics.

The central concepts of a generalised conception of a system are 'element', 'relationship', 'boundary', 'input and output', 'environment' and 'feedback'. These are referred to in figure 3.11.

A system consists of a number of elements and the relationships between the elements. A richly interactive group of elements can be separated from those in which few or weak interaction occurs. The system identified by a boundary will have inputs and outputs, which may be physical or abstract. The system does the work of transforming inputs into outputs. The processes in the system are characterised by feedback, indirectly or directly to the element that initiated the behaviour. A system so described is separated by its designated boundary from its environment. It is termed an open system if the boundary allows inputs from and outputs to the environment. A system is able to sustain an identity by maintaining itself, in a dynamic, steady state in the face of its changing environment. This is known as homeostasis.




MODEL 3.11: The Concept of a System

All systems use feedback to modify their behaviour. Through feedback, the system has the ability to do an 'appraisal' of its performance. Should the system perform to expectations even better performance can be considered. Should the system not perform to expectations, a 'post-mortem' will be needed and corrective action should be taken.

Ackoff (1995: 43) emphasised: "...the performance of a system—and organisations are systems—is not equal to the sum of the performance of its parts taken separately, but is the product of their interactions."

3.8.3. Systems Thinking

Systems thinking is the thinking process of analysis (cause and effect) and synthesis (systemic) of an integrated set of dynamic concepts.

Using systems thinking in complex situations helps make them more easily understood. Subjects can be learnt with greater ease because the connecting influences can be linked and understood. With all this complexity one is often confused.

To be a systems thinker is to have approached the situation from a number of different perspectives. Linstone (1988: 307) categorises three main perspectives: "The traditional technical perspective of systems analysis is augmented with organisational and personal perspectives. The three types of perspectives have inherently different characteristics and properties." He goes further (1988: 308): "This system may involve nature, man, society, technology, or some combination of them."

There is a need to have awareness that each system is part of a larger system. It should be considered how changes made in one system would lead to changes in the system's environment and vice versa. By considering an organisation as a system, and by considering why some organisations have a better ability to adapt than others, it is clear that the organisation (system) that keeps in touch with the constant changes in the environment is more likely to adapt to change without serious consequences.

De Geus (1988: 7): "...the process whereby management teams change their shared mental model of their company, their markets and their competitors...is likely to be a company...that learns and adapts."

If one approaches situations with this perspective then it becomes a way of thinking, a theoretical model and a way of thinking about organised coherent entities in systems terms. The usefulness of this is that one can:

- observe and describe situations systematically
- use it in problem solving
- manage reality by designing in systems terms
- use it for classification

In the context of the whole is greater than the sum of the parts, it can therefore be argued that a human being, as a walking, talking, conscious organism, must evidently be more than the sum of its parts. If this were not so then one could hardly love, hate or think, since none of these properties are present in individual parts. It is therefore logical to use systems models as abstract structures for organising our thoughts about problem situations. This is done by constructing various systemic metaphors, which can be used to interrogate the 'real world', providing insights and promoting creative decision making and problem solving.

Systems thinking, therefore, developed as an alternative to mechanistic thinking, has proved itself more satisfactory for explaining not only complex biological, but also social phenomena.

### 3.8.4. Total Systems Intervention and Improving Management Practices

Total System Intervention (TSI) offers an approach to better management practices. TSI, according to Flood and Jackson (1991), gives a broad spectrum of systems methodologies available for dealing with different situations.

TSI represents a new approach to planning and problem solving. It encourages creative thinking about the organisation and the difficulties experienced. TSI is itself a methodology in that it advocates combining three aspects of systems thinking in an interactive manner.

The philosophy of TSI is 'critical systems' thinking. This can be seen as making its stand on three issues, 'complementarism', 'social awareness' and the promotion of 'human well-being'.

- **Complementarism**
  Recognises the extent of a range of systems methodologies, each driven by a different theoretical position. This can be seen as the strength of a system. The guidance offered by complementarism is that each methodology is used only on the issues or problems that it is suited to

- **Social Awareness**
  Recognises that there are organisational and social pressures, which have led to certain systems methodologies being popular for guiding interventions at particular times.
- **Human Well-being**
  Seeks to achieve for all employees the development of their maximum potential. Work enables human beings to achieve goals to obtain well–being through social labour.

There are seven TSI principles:

- Organisational problems are too complex for a simple 'quick fix'.
- Organisational difficulties should be investigated using a range of systems metaphors.
- The appropriate systems metaphors can be linked to the appropriate systems methodologies to guide intervention.
- Different systems metaphors and methodologies can be used in a complimentary way to address difficulties.
- It is possible to appreciate the different strengths and weaknesses of different systems methodologies as related to business concerns.
- TSI sets out a systemic cycle of inquiry with iteration back and forth.
- Facilitators, clients and others are engaged at all stages of the TSI process.

### 3.8.5 Conclusion

Systems thinking and its evolution to Total Systems intervention as well as the influence of cybernetics has greatly influenced how the management theories and management problems and practices are tackled. TSI represents a new approach to problem solving based on systems thinking.

Using systems thinking helps understand organisations as systems and constructs appropriate models to deal with their complexity. It further allows us to arrive at the issues and root causes through the systems approach. It additionally helps us learn how to ask the right questions. Using systems thinking one can see the influences and feedback loops at play that allow one to formulate a theory of practiced happening and to counter these as well.

The writer believes that one has to think and practice one's life in a systemic way. It helps to understand and function more effectively. It helps to be able to proactively influence situations from both within and outside a system. It assists to see the big picture and balance the short- and the long-term prospects.

In an organisational context one can begin to systemically think about redesigning organisations differently from the historical hierarchical approach. Behaviour of different groups (unions, departments, etc.) can be assessed. And with the variables that are happening around us all the different perspectives can be accounted for.

## 3.9 THE VIABLE SYSTEMS MODEL (VSM)

### 3.9.1 Introduction

Systems thinking and a systems view of management have contributed to VSM and in turn using VSM can contribute greatly to management. VSM has the ability to deal with dynamic feedback variety and the appropriate requisite variety that remains once it has been filtered. Systems thinking requires the parts to interact as a whole. VSM structures these parts in a particular way and operates in an external environment in which it exchanges and deals with the information. VSM allows for greater complexity and variety to be dealt with in a dynamic way to such a point that reliable future predictions can be made. In its nature it is self-organising as it makes adaptations internally to meet with the dynamic external conditions.

The issue of feedback is imperative in VSM. Many of the feedback loops are designed to operate automatically and are built into the system. In the context of effective organisations the important processes to assist in the management of complexity are control and communication. They assist in the releasing of the potential of the people to handle autonomously the multiple problems they confront in their jobs. They provide the flexibility to survive in the complex and rapidly changing environments we operate within today. VSM has the ability to operate in a recursive nature, horizontally and vertically. This allows it to cover large organisations geographical and with great product differentiation.

A viable system is defined as a self-organising system, which is able to survive coherently in a particular environment. It is able to maintain a separate existence. In most cases a viable system can adapt to most changes the environment gives it to contend with. Its survival pertains to the achievement of both its short- and long-term goals. As all systems are subsidiary to other systems they take on the goals given to them by the next higher level in the system. However one can see that these goals are in fact constraints.

Viable systems are self-repairing. They can be more likened to a natural system (the ecology) than to a mechanically designed system. The various parts of the system at its different levels have to work together since the parts themselves are viable systems and are primarily interested in their own survival (see model 3.15).

Both the self-organising, and the goals directness bring to VSM a coherence or a way of encouraging the parts to work together—the VMS's characteristics and activities postulate a specific way of existing together.

Management should be encouraged to use VSM to improve the effectiveness of an organisation. Organisations are complex and their management is complex. The ability to be effective is mainly attributed to the number of variables that management needs to and chooses to deal with effectively. Using requisite variety the relevant variables and not all the variables that impact on the system has to be responded to effectively by either filtering the relevant ones from the irrelevant variables. Alternatively requisite variety promotes the increasing of the abilities to attend to the relevant variables that impact on the system. The remaining variety or residual variety is what management has to attend to and process to assist the organisation in regulating itself and surviving in its particular environment.

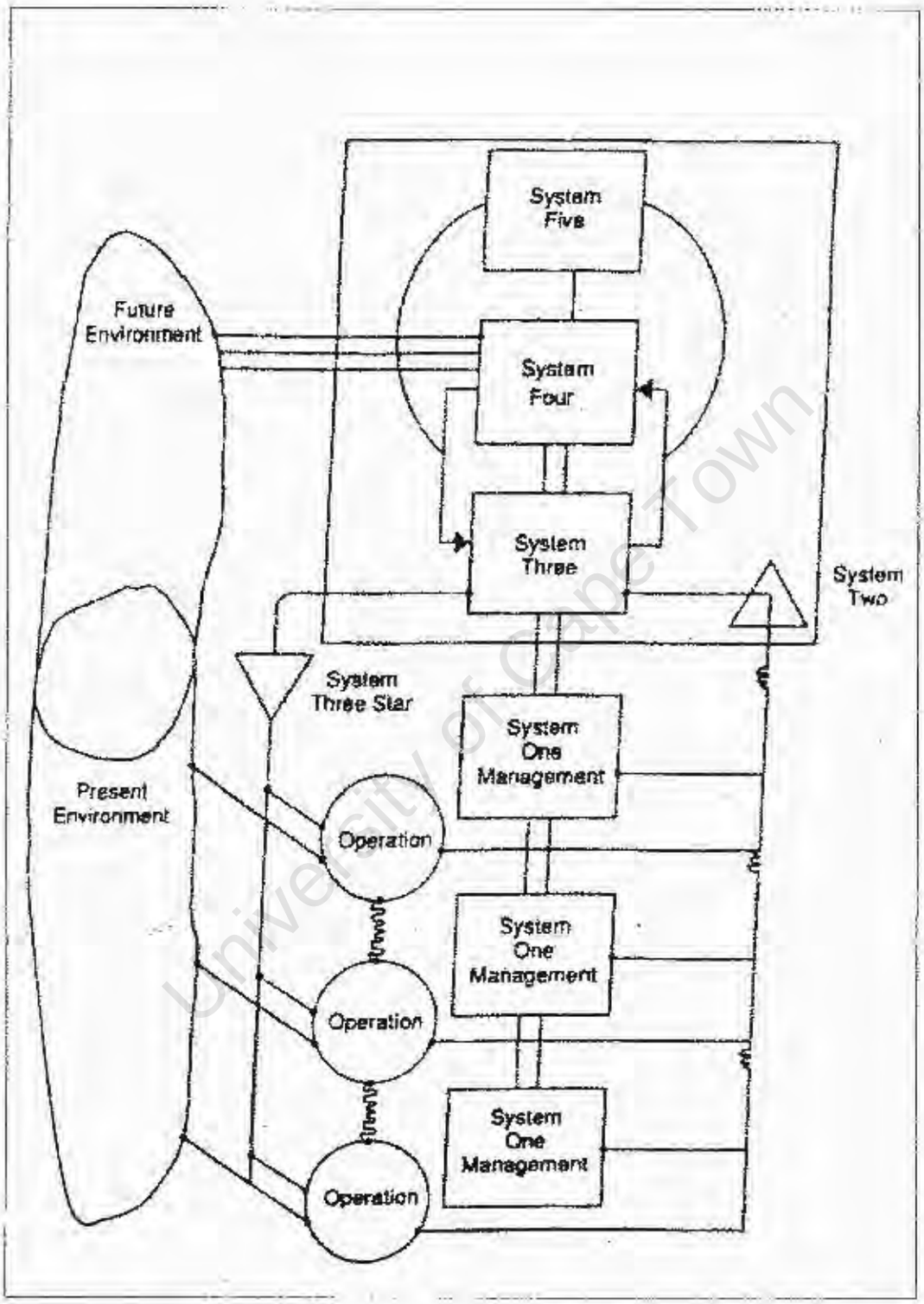
### 3.9.2. The Component Parts and Characteristics of VSM

Given below is a brief description of the characteristics and component parts of a VSM. Each word or symbol will be described in detail to fully understand VSM.

*The Component Parts*

S1 ○ VIABLE SYSTEM S1: A viable system is defined as a self-producing system, which is able to survive coherently towards a goal in a particular environment. Implementation is what the system is doing. It might be manufacturing, financing or providing a service — a management unit within an operational entity.

S2 ⋀ COORDINATING S2: S2 is the activity of ensuring the parts are cooperating for the benefit of the whole. Coordination helps to counter the weaknesses and strengthen both the parts but particularly the whole, and the relationship between the parts.




MODEL 3.12. The VSM

S3 CONTROL S3: S3 is the management system and has a number of roles. Apart from overseeing the S2 control and S3 audit function it specifically controls internal stability. It assesses how well things are going relative to the goals and policies

S3* AUDIT S3*: This is the checking or audit role.

S4 INTELLIGENCE S4: This is the information sought to discern both the opportunities and threats in the external environment. It represents the learning function in the organisation.

S5 POLICY: Policymaking requires the constant monitoring of the interaction of both intelligence (assessing the external environment) and control (assessing the internal stability of the organization).

*The Characteristics*

ENVIRONMENT
EXTERNAL: are all the dynamic variables and forces that have an effect on the internal environment.
INTERNAL: is the interaction of the internal environment.

INFORMATION FLOW
The direction of information flow.

Rn RECURSION
The whole can be found in the parts: that a whole viable system can be found in the parts of the system in focus. It is a particular form of the principle of hierarchy. It is the repetition of a system's part of a less focused viable system and also contains in itself other viable systems.

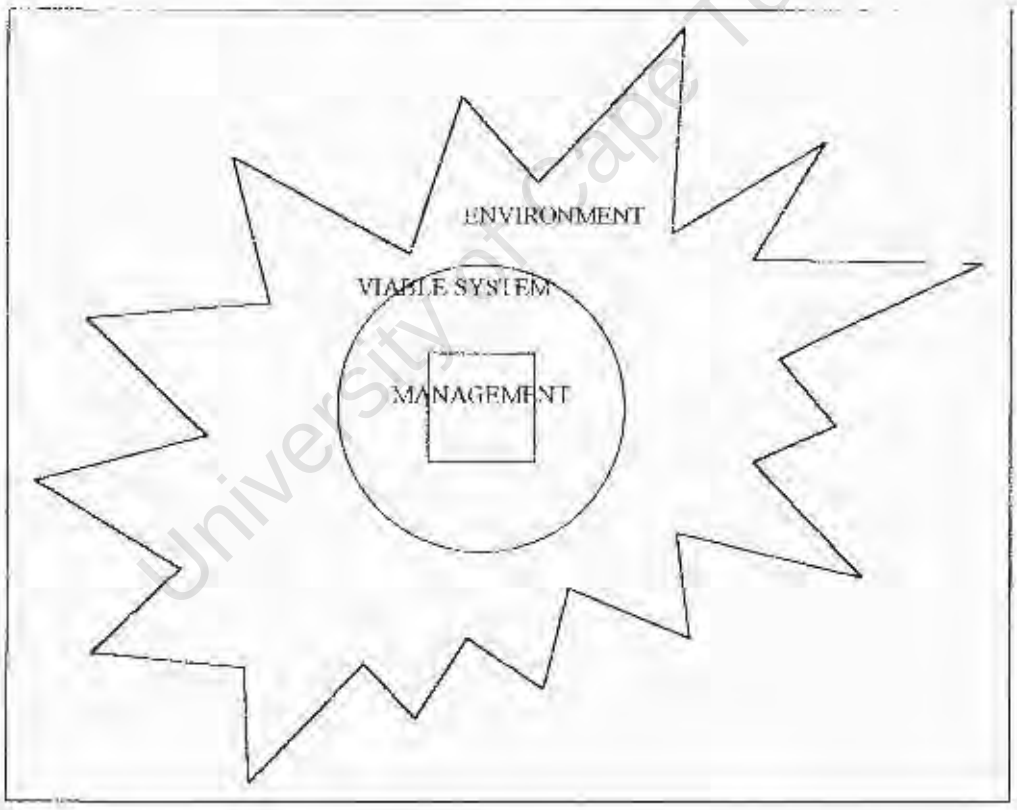
ATTENUATORS (FILTER)
Is a reducer of the number of inputs by discerning what is needed against what is not. Only letting in what is needed.

AMPLIFIERS
Is a mechanism that enhances the ability to deal with the high variety of inputs

3.9.3. The System in Its Environment

The complexity of the environment can present a wide range of variables to the viable system (VS). The VS can see some of these variables; others cannot be seen. Hence the VS receives only a limited number of variables. Thus the complexity of the environment is much larger than the system itself.

In the same way the management of the viable system is accountable for the ability of the viable system to deal with variables. Now we are faced with the imbalances that management has to deal with from the viable system and what the viable system has to deal with from the environment. This leaves us with a paradox. If management controls the viable system and the viable system tries to survive within the environment, then it has to find the relevant variables and those that produce both the disturbances and opportunities and find ways of dealing with them while still remaining viable. This is shown in Figure 3.13.



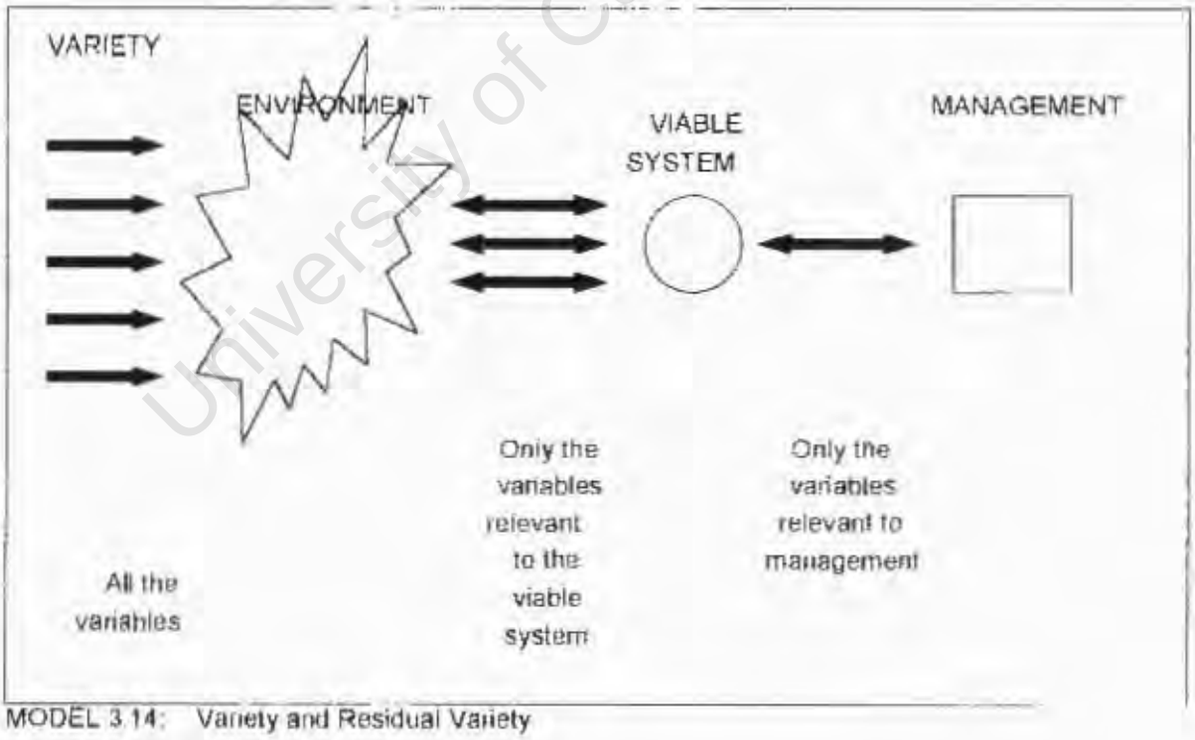

MODEL 3.13: The System in Its Environment

3.9.4. Variety and Residual Variety

The best way to show this is in the way of a diagram (see figure 3.14). Given all the variety coming in, the objective is to make the variety received by the viable system and management such that they have the ability to deal with the residual (what is left over) variety. The way to do this is through amplifiers and attenuators (filters). This is done by giving the viable system and/or management the ability to either filter what is unnecessary or the additional abilities to deal with more and more complex variables.

The filters reduce the variety; the amplifiers increase the ability to deal with the variety. How does one build into an organisation the ability to in fact does what has been described above? What policies, controls, monitors and coordination functions should be put into place to achieve what has been stated above? How does one not only 'do the right things' but also 'find the right things to do'? Unless one can do this, external change will frustrate VS and its management.

This element of the VSM is probably more appropriate in the Theory of Variation section.




MODEL 3.14: Variety and Residual Variety

The major components of the VSM i.e. policy, intelligence, control, coordination and implementation are discussed in more detail

3.9.5 Policy

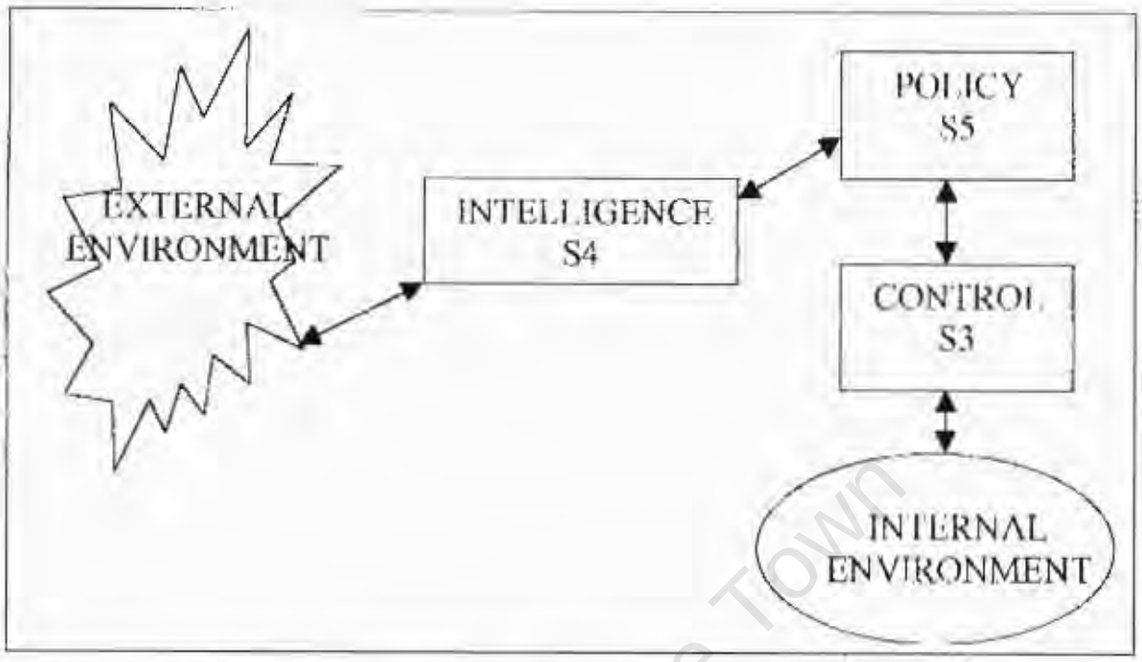
Policymaking is a low-variety process. Policy makers do not know the detail and do not wish to know the detail. Mostly policy makers are in the difficult position of deciding upon issues that are way beyond their comprehension.

Therefore the policy makers who cannot access the detailed source information themselves need to rely on filters either from the environment or the organisation. These two functions are the intelligence (S4) and the management control (S3) functions of the organisation. They are shown in figure 3.15. This figure shows an independent filter from both intelligence and control, filtering the external and internal environments, separately interacting with the policy activity. The problem however is to achieve the low variety at the policy making level and achieve a balance between internal stability and the dynamic, turbulent change of the external environment.

If there is an imbalance favoring control then stability might be gained at the expense of missed opportunities and overbearing threats. Alternatively if the intelligence functions wants changes introduced to the external environment while keeping stability in place without creating increased variety and increased operating cost as well as uncoordinated activities that could lead to organisational difficulties.

If the two filters are interacting effectively, then the residual variety from both the internal and external environments will be managed within the ability of the policy makers. One of the important functions of the policy makers is to define the identity of the organization and the primary business activities it should undertake.

In summary the policy system S5 has two very important roles. To establish and maintain the identity of the organization as a whole 'what business are we in' (mission) and to keep the right balance between maintaining the stability of the present situation and introducing the changes that will drive its future. This latter aspect will dictate how the corporate culture and ethics are evolved.

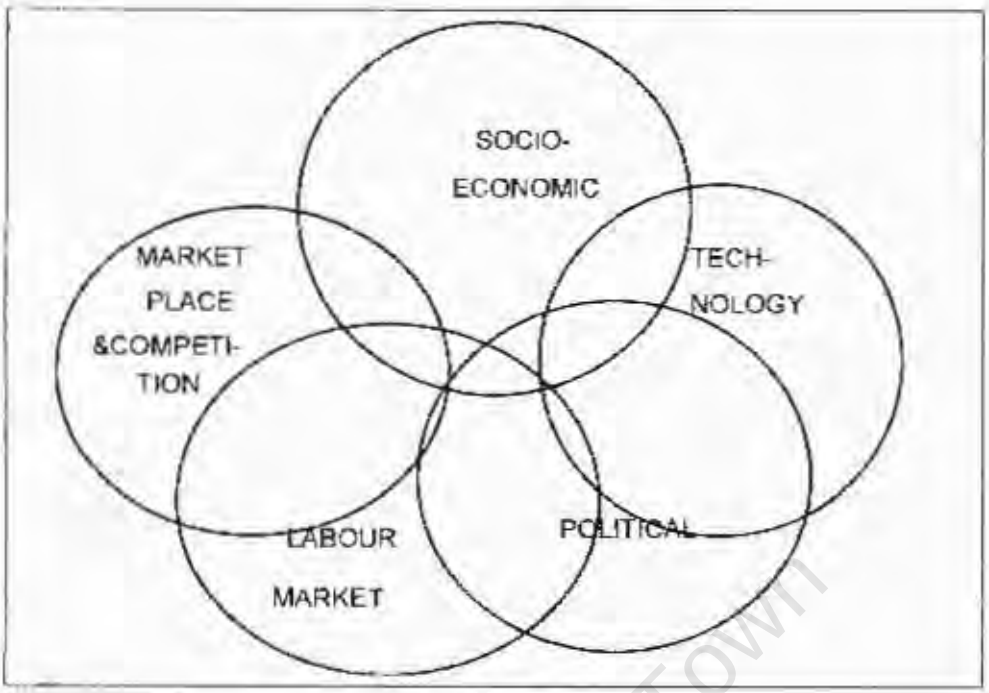



MODEL 3.15: Policy via Intelligence and Control

3.9.6. System S4 Intelligence

The intelligence process is the flow of information to and from the external environment and the organisation. It fundamentally exposes the opportunities and constraints facing the organisation. Examples are product design, external training available, market developments, technology advancements, and social limitations.

As depicted in figure 3.16, the total environment is made up of a number of external environmental issues that can and will have an effect on the organisation.

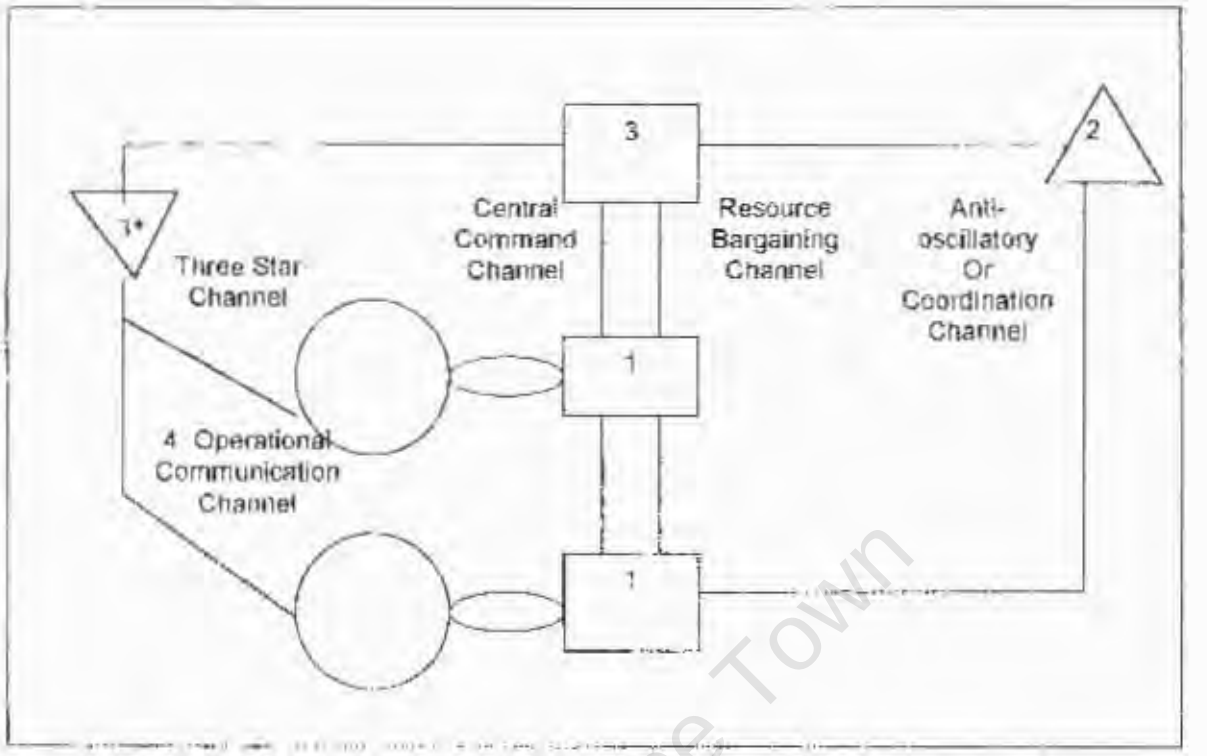



MODEL 3.16: External Systems

Where there are a large number of the environments overlapping forms the likelihood of key central issues. Good well-analysed intelligence affords the organisation opportunities to predict future conditions and adapt the organisation's' internal fitness for change and adaptation.

3.9.7 System S3 Control S3

Control is needed in order to generate internal stability within the organisation s primary activities. It manages the flow of internal information to assess 'how well things are going'. Control has to interpret policy decisions and effect their implementation. It also provides functions such as resource allocation, auditing and the line command channel (decision making channel) in the traditional organisational sense. The non-standard events are managed. A high activity of cross-functional management takes place. The best way to show the various control activities is to look at figure 3.17

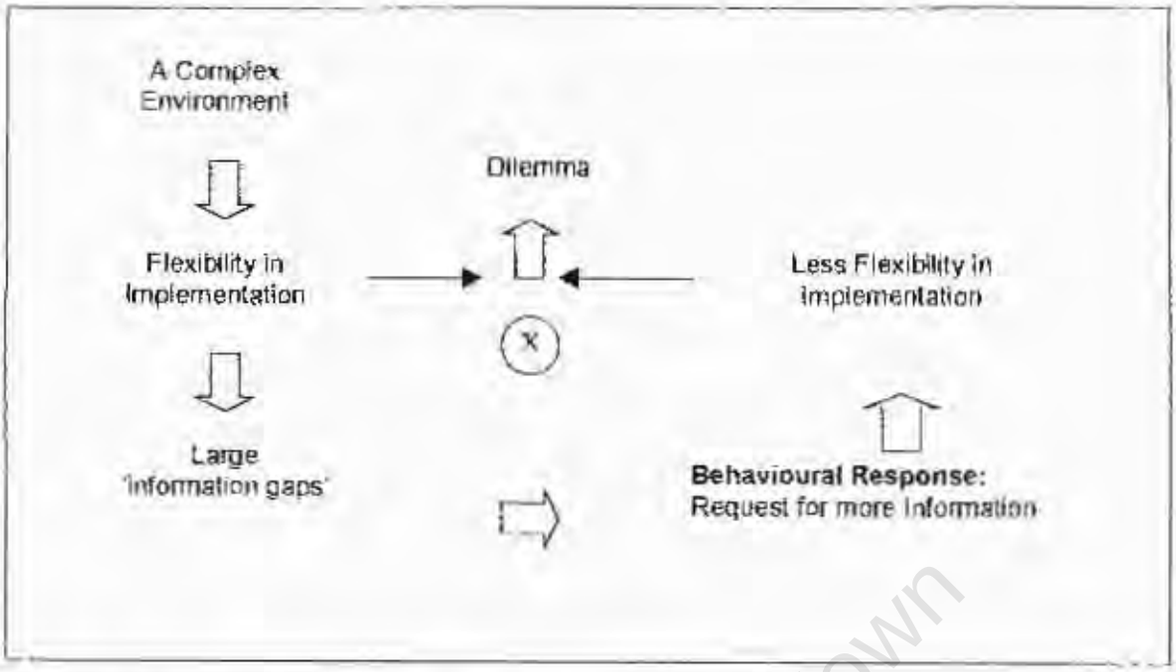



MODEL 3.17: Control Activities

This control function needs to be in control of the primary activities, the internal environment. It provides the feedback and accurate appreciation of capabilities, potentialities and performance of the primary activities.

The control dilema is described below. The first is the unfolding of complexity and the imbalances in variety. The second is the poor understanding of control and is responsible for an apparent inability to accept these imbalances.

The dilemma is based on the need to control vis- à-vis the desire to leave room for autonomous implementation. However when there is a lack of information a desire is for more to be reported to higher levels. This then increases the bureaucracy and decreases the trust levels between higher and lower management. The real objective is to reduce the residual variety to allow for both autonomous implementation of the primary activities and effective communication of the minimized residual variety to higher levels in the organisation. If this is achieved then huge flexibility is achieved in the organisation and more complete use of the human abilities are utilised.




MODEL 3.16 : The Control Dilemma

In summary the control function assists in managing the residual variety of the internal environment of the primary (System 1) activities. It has a number of sub-functions such as auditing, command communications, resource allocation, etc. The following three points are useful to support an effective control of the primary activities:

1. The control function should minimise the issuing of commands, directives and instructions and begin to allow autonomy and empowerment
2. Where possible allow the coordination function to build in self-adjustments.
3. The management of the residual variety to the control function needs to be balanced

The links between coordination and control need to be managed and if this is done it will further assist in the effective implementation of the primary function.

### 3.9.8 System S2 Coordinating

This activity coordinates the parts making up System 1 into a harmonious combination of parts. It aims to overcome the difficulties in implementation through cooperation between the parts for the benefit of the whole.

The coordination is especially pertinent when resources are allocated or needed. It brings order to the fluctuations in the organisation and makes 'minor' changes where appropriate. If our

desires to make the component parts work as a system effectively and the whole is only as strong as its weakest link then the coordination function plays an important continuous improvement role to achieve full effectiveness.

### 3.9.9 Systems S1 (Primary Activities)/Implementation

Systems 1 activities are the individual unit activities that produce the value in the organisation. They are autonomous in their own right. Each part exhibits all the features of a viable system itself. Each part connects with its own local environment.

Systems 1 activities are where the implementation of the mainstream of business happens. It is what the system is doing i.e. manufacturing a product, or providing a service. It is the activity that does something for a customer.

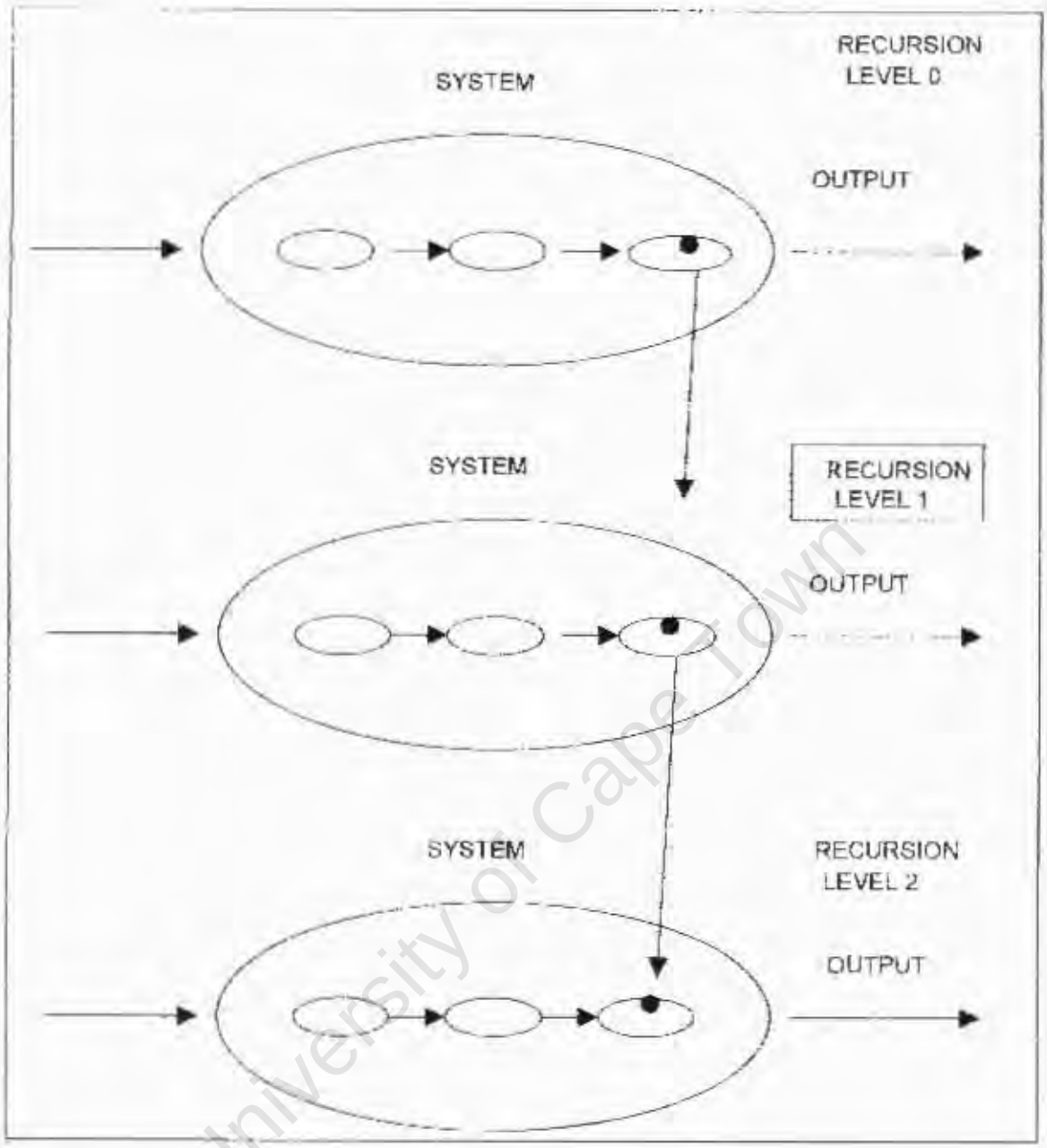
Once the system 1 activities have been defined there is still the question of how to group them i.e. geographically by product or by market.

### 3.9.10 Recursion

Almost all systems operate within other systems. This concept is called recursion i.e. all systems have other systems as parts and are part of other systems. VSM emphasises the need to consider each system at its appropriate level of recursion. The recursion level that is being considered is called the 'system-in-focus'. The system-in-focus has each of the five systems described above in it. The system-in-focus is generally deemed recursion level 1, the system it forms part of is deemed recursion level 0 and a part from recursion level 1 is seen to be at recursion level 2.

The process is to generally examine the recursion levels. It can be said that in analysing recursion levels they can be infinite. Our application is up and down the levels of a large organisation from shopfloor work team to the industry's place in the global economy. It is hierarchy in a logical sense rather than the authority sense.

In the VSM we choose our system in focus and then move up and down the levels of recursion to consider the system's component parts or the larger system.




MODEL 3.19: Recursion in the VSM

It should be noted that the same individual could perform more than one function in the VSM. The same person can also operate at different recursion levels but it is advisable not to operate on more than three levels otherwise ineffectiveness creeps in.

Recursion promotes autonomy. The parts have as much independence as is possible given the constraints of coordination and control. Vertical handling is encouraged, that is, responsibility is given to the lowest level at which it can be managed. Managing a whole job is encouraged so

that employees have responsibility for their work. If they determine the needs of their customers they can work how best to do it for themselves.

3.9.11 Conclusion

As a closing quote, Dr Russel Ackhoff (1995) pointed out some time ago: "...If anyone were to assemble the best parts from different automobile makes, the parts would not make a car (i.e.) they would not form a system."

It is absolutely crucial that management sees and manages the organisation as a system. VSM is a particular recommended model. Deming's explanations and the earlier systems thinking approaches to unlocking the leverage points is crucial. Eli Goldratt's 'Theory of Constraints' only confirms this. If management were to manage in a systems way then this would lead to better quality of work and information processes that in turn would lead to lower costed products at a better quality, that are continually improved while improving the quality of the environment.

A practical method for management to start using VSM is to diagnose the organisation using VSM. This process is called VS Diagnosis (VSD). It is covered in Appendices 13 – 16.

3.10 THE THEORY OF PSYCHOLOGY

3.10.1. Introduction

Deming (1994) explains that we need psychology to help us understand people better, to make more sense of the interaction between people and circumstances or between customers and suppliers and between supervision and subordinates.

Peter Senge's Systems Principle of Leadership goes further and indicates that leaders have a new and different roles to play.

i. as visionary leaders, creating futures and bringing a new reality that never existed before;
ii. as leaders fostering alignment and commitment to the organisational goals;
iii. as leaders, teachers and facilitators and growers of people. They create a climate of organisational learning.
iv. Leaders should distribute decision-making and create an environment where responsibility and wisdom advance together. This new need to have a system of leadership is important to get the critical mass of the organisation behind

systems, the management of variation and the management of organisational knowledge.

### 3.10.2 Peter Senge's New Leadership Requirements

Peter Senge (1995) believes that in this new era of systems thinking, leaders have to develop new skills to deal with the management of people in organisations.

The fundamentals of systems dynamics are a practical approach to systems thinking. Senge (1994) goes on to say that in complex systems, cause and effect are not closely related in time and space. The systems resist change in the form of compensation and feedback loops (i.e.) the internal balancing mechanism. He says that policy adjustments need to be limited to a few high leverage points and systemic leadership using systems thinking is required to shift the style of thinking and to realise the full potential of the organisation.

He goes further and says that leaders need to develop systemic thinking in organisations where they develop an integrative culture, which synthesises diverse viewpoints. Systemic leaders understand organisations as a whole and focus on the structure of the relationships.

Senge (1994) believes that leaders have to understand the following key issues (detailed below): firstly, the nature of causality; secondly the reactions of employees in their resistance to policy and lastly managing the key leverage points in the system:

*The Nature of Causality*

In studying the nature of cause and effect it is important to distinguish between problem symptoms and problem causes as well as understanding the system to group the causal loops in the system.

Additionally the factors contributing to the principles of compensating feedback need to be understood. These are the understanding of the balancing processes in complex systems while ensuring the values, norms, goals and habits of the organisation are taken into account.

More of a general nature, Senge believes that if shared mental models are developed and future longer term strategy is agreed then the effort put into systems and its causality will be valuable.

*Policy Resistance*

New policies often have little immediate effect and then become ineffective. Unless the systems forces are recognised, and particularly the balancing feedback mechanism, then there will be continued resistance in the form of old behaviours. The important factor is the systems understanding of the various feedback loops.

*Leverage Points*

The key is to find the few influential leverage points of the system. Often they are not obvious but when found, they can have a major impact.

The main objective is to satisfy the customer's requirement and therefore the systems analysis is to maximise capacity and reducing the variables of poor product quality and late delivenes. When doing this the long-term viability of the organisation will be supported.

Therefore systems leadership requires focusing on a small number of critical factors and setting standards within the organisation for managing key variables that have enduring value to the system. Additionally understanding the systems dynamics for the long-term success of the organisaton should be sought and operational guidelines should be built around these.

We are all tempted to try too hard. It makes us feel good, and look good to others. We are paid for performance, and many other traditional management practices encourage it. This makes it certain, in a company that does not understand the Deming transformation process that wasted effort will continue, and that tampering will be promoted.

3.10.3. Deming's Manager after Transformation

According to Deming (1994: 125-128) after transformation the manager (leader) of people will have the following 14 roles:

- The manager understands and conveys the meaning of a system.
- The manager helps his/her people to see themselves as components of the system.
- The manager recognises and accommodates individual differences.
- The manager encourages his/her people to study and grow.
- The manager is coach and counsel, not a judge.

- The manager understands the interaction between people and circumstances that they work in.
- The manager has three sources of power:
  - Authority of office (positional power)
  - Knowledge
  - Personality and persuasive power (personal power)
- The manager will try to discover if anybody outside the system is in need of help.
- The manager creates an environment that encourages trust (freedom and innovation).
- The manager does not expect perfection.
- The manager listens and learns without passing judgement on those who are listened to.
- The manager will hold spontaneous meetings with all his/her people to establish their aims, hopes and fears.
- The manager understands the benefits of and losses from competition between people and between groups.

### 3.10.4 Managing Change

Change is about life—life is about change. In trying to create a viable and sustainable future for manufacturing companies in South Africa, change has to be managed effectively. Ensuring companies are ready to accept every challenge and opportunity that lies ahead of them is the name of the game.

'It must be considered that there is nothing more difficult to carry out, nor more doubtful of success, nor more dangerous to handle, than to initiate a new order of things.' (Kotter, J and van Schlesinger, L, 1977).

Planned organisational change is often feared, because it means disturbance of the current situation, and an upset to current established ways of doing things. For this reason, needed re-organisation is often deferred, resulting in loss of effectiveness and efficiencies.

Most organisational change takes longer than expected; it sometimes destroys morale; it often uses up a great deal of managerial time and creates emotional upheaval. Many times managers are simply afraid to initiate change.

Organisational change efforts often run into human resistance. To predict what form that resistance might take, managers need to be aware of the most common reasons why employees

resist change. These are a desire not to lose something of value, a misunderstanding of the change and its implications, a belief that the change does not make sense to the organisation and, finally, a low tolerance for change.

Employees focus on their own best interests and not on those of the total organisation. Resistance can result in organisational politics.

Employees also resist change when they do not understand its implications and perceive that it might cost them more than they will gain. This occurs when there is a lack of trust between people initiating the change and the employees.

Another common reason why people resist change is that they assess the situation differently from their managers or those initiating the change, and see more threats than benefits resulting from the change.

Employees also resist change because they fear they will not be able to develop the new skills and behaviours that will be required of them.

All human beings are limited in their ability to change, with some people much more limited than others are.

*Ways of Overcoming Resistance to Change*

Many managers underestimate the ways in which they can positively influence individuals and groups during change. One of the most common ways to overcome change is to educate employees about it beforehand. Communication of ideas and institutionalising these processes helps employees see the need and the logic for change.

If the initiators involve potential resisters in some aspect of the design and implementation of the change, they can forestall resistance. Through participation and involvement the employees affected can submit ideas and thereby become part of the solution. Another way that managers can deal with potential resistance to change is by being supportive. This process might include providing training in new skills, or giving employees time off after a demanding period, or simply listening and providing emotional support.

In some situations, managers also resort to covert attempts to influence others. Manipulation in this context normally involves the very selective use of information and the conscious structuring of events. One common form of manipulation is by co-opting an individual, by involving them in a

desirable role in the change process, or by giving them a key role to play. This is not a form of participation, however, because the initiators do not want the advice of the employee, but merely their endorsement.

Finally, employees can be forced to accept change by being threatened that, if they do not accept the change, that serious resistance will lead to them needing to leave the organisation if required.

The management of change is the process of managing both the dynamic process that is always changing and getting the key players in the management team and the organisation to read the changes effectively and develop manageable opportunities for the growth and development of the organisation.

3.10.5 Partnerships with Customers and Suppliers.

Building partnerships with our current and more especially future new customers and suppliers becomes paramount. But the issue is more **how!** The writer believes that Peter Senge in his article *Through the Eye of the Needle* (p. 123) gives some of the reasons why: "...there's technology. Then there's the globalization of business which is related to technology." But he also gives us how, when he says, "But the thing that is the hardest to name and yet probably the most challenging. It concerns the unprecedented growth of the material throughput due to all industrial activities on a global scale, complexity and interdependence." He goes further (p. 127): "...what is the deepest and most profound force driving change ..it is the awareness...that we are in deep trouble...because the world we are going to be living in will be radically different. And to play a new role, business organizations will have to develop fundamentally new capabilities for understanding and dealing with complexity."

Senge continues (p. 129): "We have to develop a sense of connectedness, a sense of working together as part of a system, where each part of the system is affecting and being affected by the others, and where the whole is greater than the sum of its parts." Basically systems thinking.

The systemic nature of the major supply chain in any organisation requires the partnerships of many suppliers and customers acting together.

## 3.11 THEORY OF VARIATION

### 3.11.1 Introduction

The knowledge of variation is an important link between managing in a systems way and the theory of knowledge. Variation if not managed leads to waste, poor quality product and organisational loss.

Deming (1994:173): "Variation is the product of any system... management's job is to study variation, with the proper theory ...so as to unravel the message that the variation is trying to tell us: ...how to improve the process."

Variation needs to be recognised and understood, as it takes on a number of forms. Variation is caused. It gives an indication of what the organisational system is capable of producing. If the information arising from variation is not appropriately actioned it can lead to disastrous results or, alternatively, great improvements.

Variation is treated as a source of knowledge about how the system operates. This knowledge can be used to redesign for improvements.

Management's responsibility is to reduce the amount of undesirable variation and by not overreacting at the wrong time, achieve greater uniformity of product and service.

If the organisation wants to create superior value for customers then management needs three kinds of knowledge: customer needs, product knowledge and capability knowledge.

Stable variation is consistent—the results fluctuate randomly around a steady average or in other words the process is statistically under control.

Statistical control charts provide one method to study variation. They provide management with the means to make clear judgements of results and to minimise mistakes if interpretations of results are correctly done.

### 3.11.2 Management's Role in Managing Variation in Organisations

The real benefit comes from all management knowing about the theory of variation, recognising it, interpreting the managed data and deciding what appropriate action to take. Management needs to know the seven concepts of variation. These are detailed below. Deming (1994:174-188):

| |
|---|
| 1. All variation is caused |
| 2. There are four main types of causes<br>• **Common causes**<br>This is a myriad of ever-present factors inherent in the system<br>• Special causes<br>The factors that sporadically induce variation in the system i.e. assignable cause over and above that are inherent in the system.<br>• **Tampering**<br>Tampering is caused by unnecessary adjustments in attempts to compensate for common cause variations.<br>• **Structural variation**<br>Regular, systemic changes to input e.g. seasonal patterns. |
| 3. Be able to distinguish between the four types of causes and able to apply the different management actions |
| 4. Have a strategy for special cause<br>• Get timely data<br>• Investigate special cause<br>• Find out what was different<br>• Seek to prevent bad and keep good causes |
| 5. Have a strategy for common cause<br>• Receive all relevant data, not only the recent information but also the trend lines and therefore understanding the entire system.<br>• Gain an in-depth knowledge of the processes involved<br>• Use various tools e.g cause and effect to identify changes to the system (control charts, Pareto diagrams) |
| 6. Try and achieve all systems variation to common cause thereby achieving systems control. |
| 7. Use statistical process control mechanisms to achieve this. |

TABLE 3.20: The Seven Concepts of Variation

Dr Shewhart believed this brought about fundamental rethinking. Few processes involving people are stable to start with. In fact unless a process has been measured, preferably on a control chart and shown to be stable, we should assume it is not.

The crisis management syndrome is one where praise is sung for resolving a management problem. Prevention is 'theoretical' and is seen to be less practical and glamorous. To prevent an illness we must understand the whole system in its complexity. Prevention takes time and it is often overlooked.

Adjustments prevent things from getting worse and thus everyone must try to keep things 'within specification' as the first objective. Improvement is eventually what it is all about. Rigorous application is required once the process is stable. Management should monitor the experimental effect of any changes so as to prove effective.

If only this one concept of variation could be fully understood, and enthusiastic effort put into truly understanding the system, then the knowledge of the source of the problem can be achieved.

Finally it should be noted that the Requisite Variety Principles and the S4 Intelligence system and the S3 Control system are also specific forms of managing variety.

## 3.12 THE INTEGRATED RESEARCH METHODOLOGY

The integrated methodological approach is made up of three research methodologies integrated into a usable model for the implementation of effective organisational improvement in a changing external environment. The three are Action Research (AR), Soft Systems Methodology (SSM) and the Scientific Method (SM). Supportive intervention in the form of participant observation, unstructured interviews, capability studies and Statistical Process Control (SPC) control charts should also be used in the data gathering process. Various other techniques mainly the interrelationship diagraph, the affinity diagram (AD) and systems model diagrams are recommended for use.

As can be seen from Table 3.21. The combination of the three approaches covers four main stages. The first looks at reality and is made up of an analysis of the real situation so as to seek relevance. The second moves to the abstract where theorising and systemic thinking processes produce applicable systems for the situation to be used as a comparison before action. The third stage requires going back into reality and actioning the plan to achieve utility. Lastly the fourth stage requires returning to the abstract to reflect, review and learn from the process to gain validity.

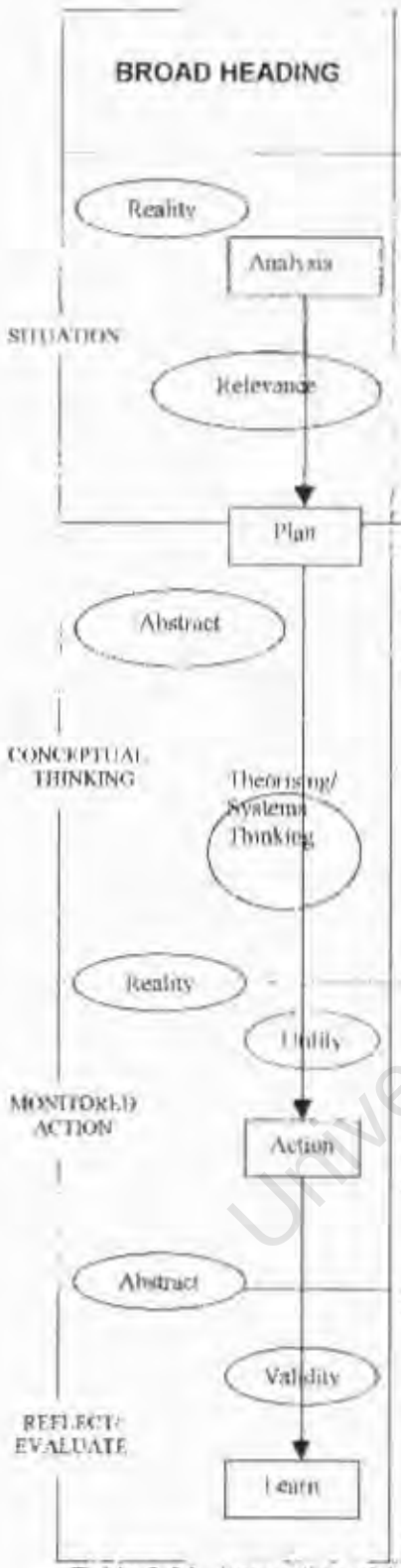
Each contributes differently to a disciplined approach that is rigorous and scientifically constructed. Significantly the three approaches assist in contributing to knowledge by drawing from experience (reality), and building from authority mainly from literature in the form of the systemic thinking and lastly adding the logical reasoning to it.

### 3.12.1 Action Research

The Action Research process is used to improve management practices. It is an applied research process that takes a real live problem and after a full analysis of the problem plans an intervention, while predicting the theoretical consequences. The subsequent steps of the implementation and monitoring of the intervention are put in place. An evaluation of what really happened and reflection against the theoretical outcomes predicted are then evaluated. This is the start of an ongoing cyclical process of research, learning and greater understanding of the situation and a contribution to its improvement.

Mental models covered in 3.4 drive the behaviour of most managers and hence mental models in the minds of managers are the basis for their management practices and collectively become the management practices of the organisation. For action research to be of any useful value, it is important that the following steps are processed:

- The situation is analysed while identifying the key issues.
- The mental models in use are fully understood so as to clarify the goals and assumptions.
- A thorough data-gathering process is done to establish a clear picture.
- Theoretical outcomes that are possible are formulated and expanded upon.
- Predicted outcomes are put forward before actions are taken.
- Options are generated for action with proper design of the intervention including what is to be monitored.
- Action is implemented.
- A thorough evaluation is conducted to obtain a full understanding via a gap analysis between actual and predicted results. This provides for improved insights and growth in experience, and reflection and modification to the mental models and theory. This in turn leads to learning and improved management practices.
- Monitoring is done while the actions are implemented.
- Starting at the beginning of the process again and repeating the steps.




| BROAD HEADING | THE STAGES OF ACTION RESEARCH (AR) | SOFT SYSTEMS METHODOLOGY (SSM) | THE SCIENTIFIC METHOD IN MANAGEMENT |
|---|---|---|---|
| | 1. The situation – identify issues.<br>2. Clarify the goals and develop assumptions.<br>3 Establish clear picture.<br>- data gathering<br>- use ladder of inference (Senge) | 1. The problem situation unstructured<br>2. The situation analysed → Rich Picture (issues and primary tasks) | Observation (or Survey) |
| | 4 Test and expand theory.<br>5. Predict outcomes / consequences.<br>6. Generate options for action and design intervention (schedule and what to monitor). | 3 Relevant systems and root definition<br>4. Conceptual models.<br>5. Comparison of conceptual models and clear picture leading to items for Action Agenda<br>6. Debate and agreement of action with people involved | Theory Formulation (and Policy)<br>Predict results |
| | | 7. Implementation of Agenda Action Steps (changes). | Test Theory<br>Actual results (Ops Management) |
| | 7. Action<br>8. Monitor | | |
| | 9. Reflect to<br>- understand<br>- draw insight<br>- grow in experience<br>- reflect and modify theory<br>- learn<br>10. Repeat process. | | Comparison<br>Reject/modify or confirm<br>Adjust theory (audit/control)<br>Repeat process |

Table 3.21: Integration of AR, SSM, and the Scientific Method

Too often mental models are used without thinking. No analysis or reflection is done and therefore the results are repeated inappropriate actions. This results in ineffective management practices especially in the context of the number of variables and the speed of change in which we operate in this day and age.

Action research contains the main elements of traditional research. Starting with a problem and a hypothesis of a focused situation, data being gathered, analysed and solutions sought. AR is however an involving process and an action orientated process to improve an organisational situation. In the Internet article, *The Essentials of Action Research and Understanding Action Research* by Roger Bennett and Jim Oliver, the key issues of AR are given. They are summarised below.

*The Stages of Action Research*

Introduction

AR is a circular process where having described the issues of the problem, questions are asked, a mental model/theory is put forward and clear predictions are formulated. Action then follows, the data is collected, analysis is done and further action, and so the cycle runs a second, third and more times. Sometimes the learning needed, or solution achieved needs only one cycle. To support effective change each of these processes needs to be inclusive of the appropriate stakeholders.

**Stage 1: The Situation**

This refers to an organisational issue. It describes the context of the situation, giving details of the historical background. It gives clarification to the situation at hand. This process is recursive with successive feedback sessions and is developmental in understanding the problem(s) and arriving at solutions.

**Stage 2: Goals and Assumptions**

This is a planning stage i.e. what needs to be achieved, or what problem needs to be solved, or situations improved. Certain assumptions need to be made and cleared up.

**Stage 3: Data Gathering**

This constitutes the major part of the process. The data helps identify what the real concerns are and what actions will contribute to improving the situation. The data collection methods used are participant observations, participant unstructured interviews and the use of capability studies and SPC control charts. Wherever possible a source of information is used to ensure its integrity.

**Stage 4: Test and Expand Theory**

This stage is not specifically mentioned in the particular authority. However, it has been included here. It is where one formulates a theory to use as a base to reflect against. Subsequently one makes it available for testing and adaptation in recursive cycles.

**Stage 5: Predict Outcomes and Consequences**

Again the writer is inserting this stage, which is not in the particular literature. If you theorise and then go further and in fact (particularly with ongoing cycles) predict the future outcomes and consequences, then AR brings its real value. This facilitates learning and future predictions in a fast-changing environment.

**Stage 6: Generating Opinions for Action**

To effectively arrive at possible action plans that have the commitment and support of the key people that will implement the actions is important. Hence generating options with those involved from the data already gathered is expressly an inclusive process.

**Stage 7: Taking Action**

This is an important stage in the entire process. It has been said that unless you take action on a system you will not understand it. This is where the improvements are made, the learning accrued, the solutions implemented. As the action is being implemented the process needs to be monitored further as to where follow-up actions might be necessary.

**Stage 8: Monitoring**

The writer is inserting this stage (not in the literature referred to). If you decide upfront rather like in a capability study what is important in the process and therefore what to measure, then both during and after the process this data can be documented and at this stage monitored.

**Stage 9: Reflection**

It has been mentioned a number of times that AR is an inclusive process to achieve real understanding and improved situations that are sustained. It requires the commitment of all the relevant parties to achieve successful improvements to organisational problems. Sometimes a steering group champion is required to monitor the process. A network or support group might be helpful as a sounding board i.e. mentor, coach, etc. Working groups also broaden the impact, heighten the learning achieved or increase the extent of the improvement. The inclusiveness of the right people cannot be underplayed.

**Stage 10: Repeat the Process**

As AR is recursive, it is not often that all the learning is done or the situation is achieved in one cycle. More often it is lengthy particularly with complex situations. It can be life long.

*Conclusion*

AR's main objective is to assist managers become effective in resolving their problems and making improvements. It is about learning and applying that learning. This learning should increase your and other's body of knowledge. The researcher is part of the process and acknowledges the influence in the project. AR is synonymous with action learning. It is where real problems are solved by focusing on the problems and not on the underlying research issues.

3.12.2 Soft Systems Methodology (SSM)

*Introduction*

SSM as documented by the Open University is used to analyse complex organisational situations that are intermixed with human factor issues. It helps to untangle the organisational 'mess'. It provides an abstract and a detached look forward, as to what a situation could be. It allows for a view of a future state. Different worldviews and mental models (personal opinions) can be factored in when gathering information from all quarters. Disagreements can in fact be represented as part of the problem.

A summary of the SSM steps follows. It provides an analysis of the current state giving factual and subjective information entitled the Problem Unstructured and the 'rich picture'. The 'rich picture' is not a system representation but a methodical process to summarise and analyse the

issues. Systems relevant to the problem mainly in the form of the essential tasks and the human issues at play are carefully described with full definitions (root definitions). These essential activities are then represented in a conceptual model. Part of this process is identifying the various stakeholders, actors, owners and transformation processes involved. A comparison of the relevant systems with the summarised current state/situation in the form of a 'rich picture' provides an intellectual process of proposing possible action steps to solve the concerns raised. These then become Agenda Points for further discussion. SSM provides a systems paradigm view and a systemic view of both problems and possible future solutions. Having raised the possible interventions it proposes a debate and the inputting of other worldviews. This process requires a discussion of the possible interventions with the stakeholders and in itself assists with the implementation of the changes. The agreed changes should be both systemically feasible and desirable. The analyst is part of the problem and process and needs to be sure of his/her role. Additionally other roles have to be clarified during the process— who the owner of the problem is, who should be solving the problem and who the client is (who asked for the study). Finally it facilitates rigorous systems thinking, different perspectives and a cyclical process.

The seven stages of SSM are given in more detail below.

*The Stages of SSM*

**Stage 1: The Problem Situation Unstructured**

This takes the problem situation and looks at it in as open a way as possible, without trying to box it into a particular way of thinking. This process assists with not stumbling across the first solution but looking beyond the obvious. Additionally, it gives time for the processing of what may look like a 'mess' of unrelated events. It further does not impose any structure on the analysis. The process of inquiry asks: What is the current state? What does it do? Why does it do it? How does it do it? What is its purpose and why does it exists? It also assesses the relevant content and environment to the situation.

**Stage 2: The 'Rich Picture'**

The 'rich picture' is a summary representation of the problem situation and combines the primary tasks facing the organisation and the human issues that are at play mainly between individuals influencing the situation (this is mainly subjective from the participant observer's viewpoint). Effectively the 'rich picture' is an efficient, economical and illuminating summary of the whole situation in all its complexity. It allows one to sit back and view the situation, like a road map. It contains hard information (facts, data, statistics and more). It contains mainly the primary tasks

and soft information around issues that are usually subjective with summaries of perceptions and guesses of the interplay at work.

The steps involved in the formatting of a 'rich picture' are as follows:

- Look for elements of structure—those things that are slow to change.
- Look for process elements.
- See where process and structure interact as this could indicate cultural elements.
- It is not representative of the system.
- Annotate and use symbols.
- Include yourself.

Note that it is wise to have two rich pictures, one for private analysis and reflection and one for public debate uses and sharing with colleagues. You can add to the rich picture as you proceed and, with time and fresh analysis, see new perspectives.

**Stage 3: Identifying Relevant Systems and Root Definitions**

The SSM now offers a move into the abstract as the next process. This requires three steps and allows one to view the situation in a systemic way:

- identifying and naming the relevant systems
- compiling root definitions
- drafting a conceptual model

The process in identifying the relevant systems is to imagine and name the relevant systems to the problem that will yield insight into and improve the situation. As with complexity it is likely that several relevant systems are involved. Essentially the systems are human activity systems. The process of compiling root definitions is describing as precisely as possible in words the essential parts of the process in the relevant systems. There are many ways to formulate root definitions mainly by trial and error. However a process that assists here is a CATWOE evaluation. This provides a method of assessing whether your root definitions are complete.

Using the CATWOE process forces you to ask searching questions about the definitions one has drafted and review them where necessary.

| | | |
|---|---|---|
| C | = | Customers (those that receive the output of the system) |
| A | = | Actors (those who carry out the activities) |
| T | = | Transformation processes (what happens to the inputs, what is done in order to achieve the outputs) |
| W | = | World view (this forces you to be explicit about your personal views and hence when debating with others their personal views) |
| O | = | Owners (those that have the power and the control of resources to stop the process) |
| E | = | Environmental constraints (what are accepted as systems constraints) |

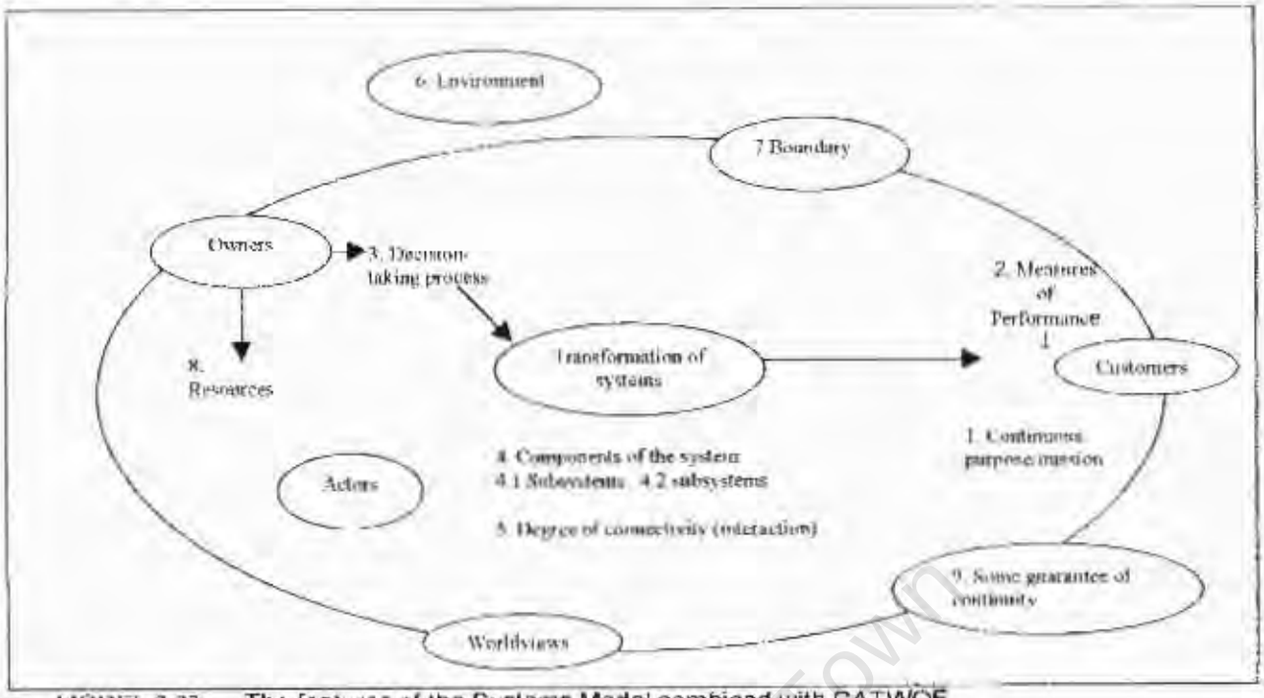
Table 3.22: The CATWOE

**Stage 4: Conceptual Model**

Having described what the system is and what it does, the next process is to build an activity model of the system—a graphical representation. This is called a conceptual model and is purely abstract. This model is derived from root definitions. This process is discussed in further detail in Appendix 18.

The following are the steps to be followed in building a conceptual model:

- Describe with 'verbs' the elements/activities of the main activities system.
- Scrutinise root definitions and write verbs.
- Arrange/rearrange them into a list of primary activities (between 6 and 12) in a logical sequence.
- Examine each in turn and ask what back-up activities does each primary activity require.
- Your model will now have clusters of primary and secondary activities.
- Note they are NOT REAL WORLD but purely logical and abstract i.e. keep the conceptual model as detached as possible from the problem situation. This allows one to develop an alternative systems view of the situation, which can be compared.
- The model is constructed in terms of **'whats'** not 'hows' as 'wheres' are general and belong to the abstract world. This now allows you to revise the root definitions as a result of compiling the model.




MODEL 3.23: The features of the Systems Model combined with CATWOE

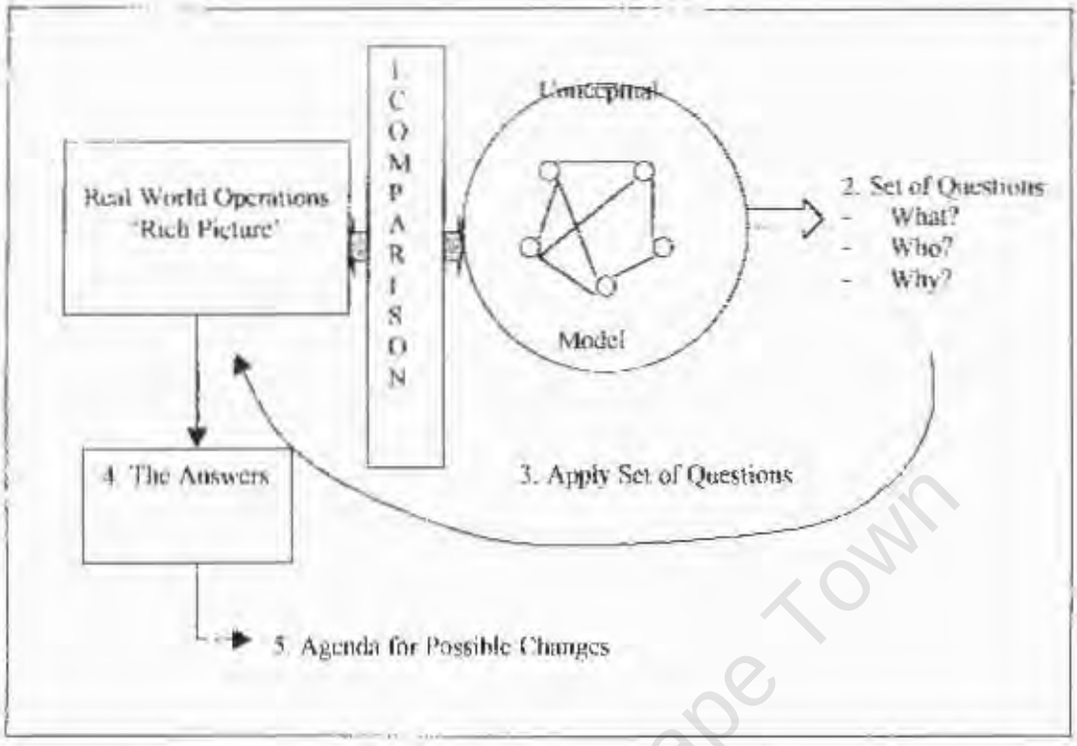
A way of testing a model to ensure that it is complete and adequate is to compare it to the features of "the Formal Systems Model". The features of which are shown in figure 5.1. The writer has added the CATWOE into it to create an evaluation process of both the model and the root definitions.

This evaluation provides us, once again, with a list of critical questions that can be asked of the conceptual model. The open Universities paper believes that this process in particular is highly practical and that it stays within the boundaries of a good working system.

**Stage 5: Comparison of 'Rich Picture' with Conceptual Model**

At this stage you return into the real world where you take the problem situation as represented by the 'Rich Picture' and compare it to conceptual model and in that way draw inference from the comparison. As might be expected there are some similarities and there will be some differences.

The process recommended is to set aside an intensified, focused time (for a day) to really compare the real world operating with the conceptual model. Some of the specific steps are detailed in Model 3.24.




MODEL 3.24: Comparison of 'Rich' Picture with Conceptual Model

Shown in Table 3.25, the comparison leads to the questions to be asked and the items for processing with the stakeholders (Agenda items) for a discussion

| Set of Questions or Activity **From Concept Model** | **'Rich Picture' Real World Problem Situation** | **Comments** | **Item for Agenda for Stakeholders to Debate** |
|---|---|---|---|
| Questions? From model<br>1. Does it happen in the real world?<br>2. Who does it?<br>3. What history?<br>4. Why is it done this way? | → Try to answer on the basis of the real situation. | → | → Yes or No |
| What Activity In the Conceptual Model → | is it present in the real world? → | → | → Yes or No |

Table 3.25: Arriving at Items for Discussion

The purpose of both these above approaches is to generate possible agenda items as topics for discussion.

Once again this process as has been done before could make you change some of your earlier views of the situation. If this is the case it could lead to filling in information into the 'Rich Picture' or even to Relevant Systems.

**Stage 6: Debate With the People Involved**

This leads to the stage of debating the issues raised with the stakeholders involved. These include the client, the problem owner and the problem solver as well as other appropriate people. The objective is to debate the solution ideas and the possible changes that are emerging from the analysis. The agenda items that are agreed to should be answered by both the following criteria given below:

- It is systematically desirable? Does it make sense in terms of the systems and is it within the bonds of systems thinking?
- Is it culturally feasible with those who are the actors and is it feasible with those who have to live with the implementation consequences?

It should be noted that in some circumstances it might be better to do nothing than to take action for the sake of it.

**Stage 7: Implementation of Agreed Changes**

Having been through the above process with the actors and owners of the problem situation the whole approach is based on the premise that changes will only happen if those that are directly involved are persuaded to implement the changes agreed to.

There are four types of changes that are generally implemented:

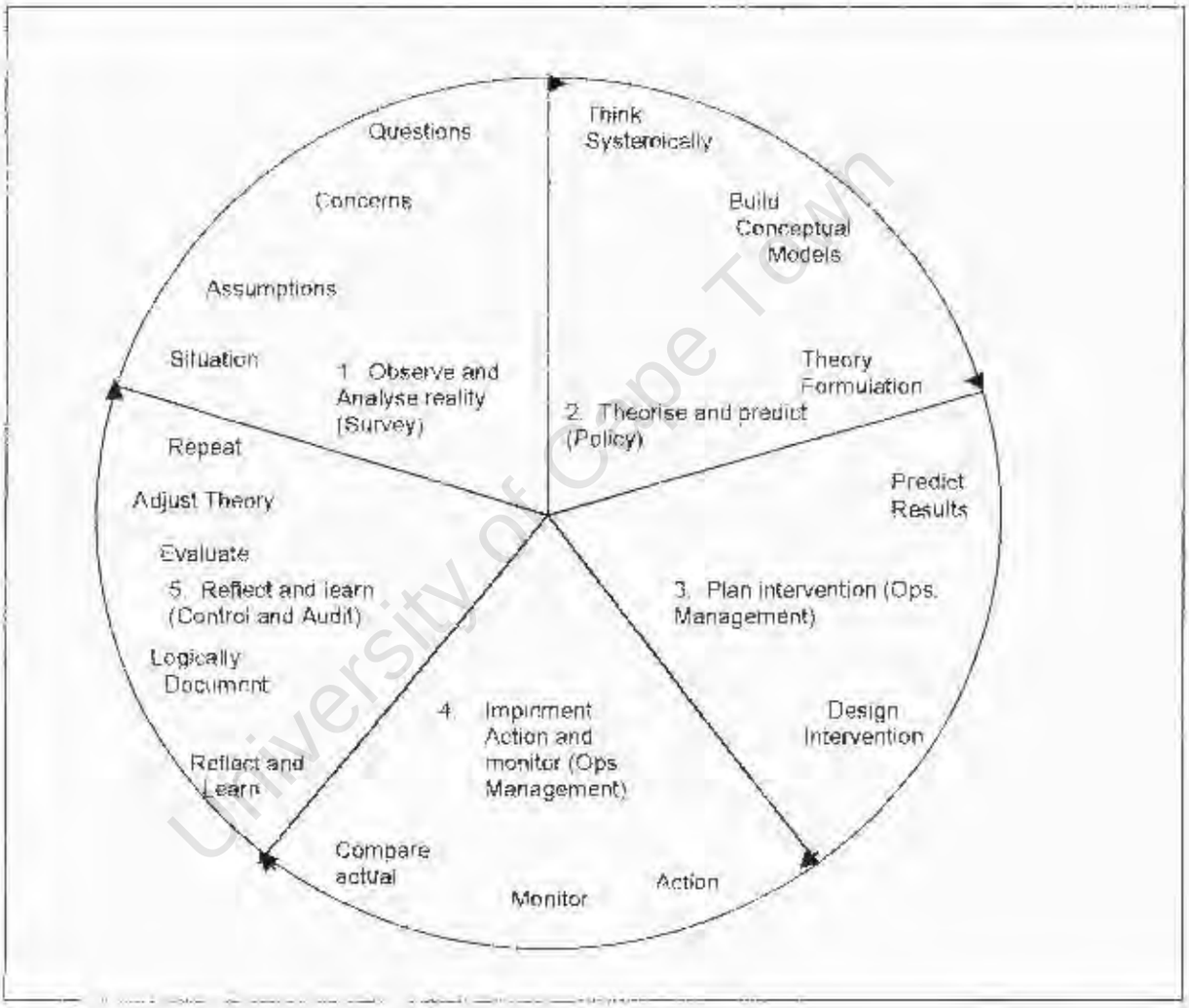
- change in structures: these are changes in organisation structure
- changes in procedures or activities
- changes in policy—goals and strategies
- changes in attitude

3.12.3 The Scientific Method

The detail of this is given in Appendices 17 – 19.

## 3.15. CONCLUSION

The integration of AR, SSM and the Scientific Method gives a very useful methodology for the research process to improve management practices.




MODEL 3.26. Cycle of AR, SSM and the Scientific Method Combined

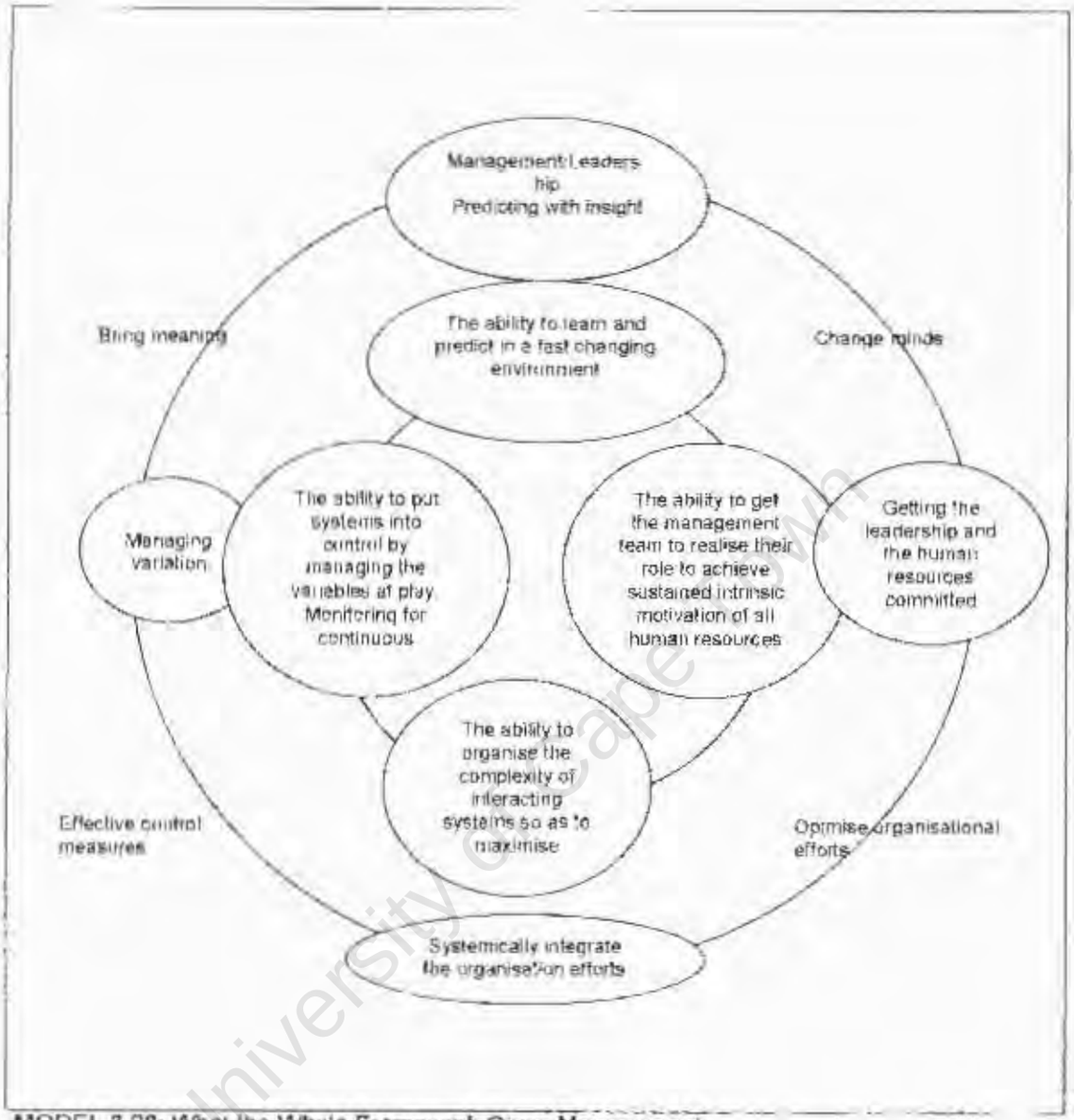
Overleaf is a tabulated summary of the integration of AR, SSM and the Scientific Method. It follows the cycle in the right-hand column reflected in Model 3.26 and complements the table shown in 3.21 and acts as a conclusion.

| | | |
|---|---|---|
| Observe and analyse the situation and establish the key issues and their interrelationships thus creating Relevance in the reality<br>(Survey) | 1. Gather raw information and identify the issues.<br>2. Clarify the goals and assumptions.<br>3. Establish clear picture, 'Rich Picture', develop concerns.<br>4. Ask questions from step 3. | SITUATION<br>↓<br>ASSUMPTIONS<br>↓<br>CONCERNS<br>↓<br>QUESTIONS<br>↓ |
| Abstract, Theoretical and Systemic Thinking Process.<br>(Policy) | 5. Postulate the relevant theoretical systems and develop a proposed conceptual model of this and compare with the situation. | SYSTEMS THINK<br>↓<br>BUILD CONCEPTUAL MODELS<br>THEORY FORMULATION<br>↓ |
| What should happen. The plan.<br>(Ops Management) | 6. Propose, test and expand a theory towards a solution.<br>7. Predict outcomes and consequences.<br>8. Design interventions together with actors/owners and generate options of action implementation and what to monitor. | PREDICT RESULTS<br>↓<br>DESIGN INTERVENTION<br>↓ |
| Action to achieve utility back in reality.<br>(Ops Management) | 9. Implement agreed action steps.<br>10. Monitor agreed measures.<br>11. Answer questions to improve concerns in situation. | ACTION<br>↓<br>MONITOR<br>↓<br>COMPARE ACTUAL RESULTS<br>↓ |
| Abstract analysis and reflection to achieve learning and validity and logical rationale of learning and results.<br>(Control and Audit) | 12. Reflect so as to understand, draw insights, grow in experience, reflect and improve theory, towards learning.<br>13. Document logical arguments that scientifically link Situation → Concern → Question → Systems Thinking→ Theory → Action → Monitor<br>14. Evaluate whole process.<br>15. Repeat and go back to step one. | REFLECT AND LEARN<br>↓<br>LOGICALLY DOCUMENT<br>↓<br>EVALUATE<br>↓<br>ADUST/MODIFY THEORY<br>↓<br>→ REPEAT↑ |

Table 3.27: Integration of AR, SSM and the Scientific Method

Model 3.28 summarises what management can achieve. It gives management the ability to learn, through cycles of theory and practice, and predict the future with insight.

It provides the basis for the transformation of management. Each of the elements should be covered in a holistic way.




MODEL 3.28: What the Whole Framework Gives Management



The framework provides the ability to learn faster in a systemic way and taking into account the people issues as well as managing variation. The framework provides the model to establish strategic capability backed up by supporting operational capability.

It allows for an integrated system of thinking, a planning process that broadens the options for implementation, as well as a coordinated set of transformation processes that draw the appropriate stakeholders into the action and finally it provides an ability to learn with meaning to assist in prediction.

The model 3.28. above summarises what management can achieve. It gives management the ability to learn, through cycles of theory and practice, and predicts the future with insight. The VSM

# CHAPTER FOUR
# PLANNED INTERVENTIONS

Planned Actions and Some Actions Implemented at ASTAS

## 4.1. INTRODUCTION

The planned actions and some actions implemented at ASTAS took place in a scattered and uncoordinated way over the two-year period 1998-1999. These interventions and recommendations were relevant to the particular various theoretical inputs being covered at the time. They were not coordinated as the framework is recommending. They were also attempted against the backdrop of much fear and despair regarding the demise of ASTAS.

The situational context covered in chapter one, as well as the assumptions, concerns and questions covered in chapter two, act as inputs. Additionally the 'rich picture' of ASTAS can be seen in Appendix 20.

The process that follows summarises the actions or recommendations at ASTAS. The development of the relevant systems and their root definitions particular to ASTAS was one of the last processes completed. This gave rise to some agenda items for the management team to consider for debate.

The outputs in this chapter are the final recommendation of the formulation of the integrated framework for manufacturing management in South Africa. This also is a contribution to the writers learning process and improved management practices.

The various initiatives either implemented or recommended will now be covered.

## 4.2. LEARNING, MANAGEMENT INQUIRY AND THE SCIENTIFIC METHOD

The writer believes that the key issues that are needed after covering the Learning Management Inquiry and the scientific method were:

1. encourage **management inquiry and learning**
2. utilize the **scientific method** with rigorous application to squeeze out better decisions

3. create fuller **partnerships** with **customers, suppliers**, and **employees by** reshaping **leadership** where **teamwork** and **coaching** are the keys to success
4. develop **effective thinking processes**

This above list effectively is the basis for a new mental model of thinking and partnership process.

## 4.3 VSM INITIATIVES

The situation at ASTAS was extremely fluid. Assessing the organisation against a VSM background whilst being in a state of flux was very appropriate. Yet to achieve answers given the uncertainty was not so easy. However, some contributions were implemented and found to be helpful.

### 4.3.1 Intelligence

The building of an intelligence system had started. The marketing director of 14 years had retired and been replaced by a person who was well aware of the export market scenario. He was a communicator and completed trip reports reflecting the intelligence gathered and circulated it to the senior management. It was decided to have weekly meetings regarding the marketing opportunities and have them separated into focused efforts in the various segments of the markets as well as the export opportunities. A person had been permanently appointed in Europe and one in America. The beginnings of what the market was, what products could be competed in were filtering back.

There were other issues such as possible joint venture possibilities and supplier agreements that needed to be assessed. All of these were being factored into an 'intelligence' meeting where the financial, marketing and manufacturing possibilities were processed.

The analysis was so buoyant that until some of the issues bedded down and were brought to finality the process continued to circulate. This was later to collapse when the further retrenchments took place and key people resigned due to the uncertainty of the situation ASTAS faced. This is where it remained until the demise of ASTAS.

### 4.3.2. S1, S2 and S3 Meetings Were Separated in Manufacturing

In the past there were a weekly production meeting with all the other closely related departments participating. They started at 13:30 on a Wednesday afternoon and often did not get finished until 16:30. The writer was recognised that this should be changed

At the beginning of 1997 the format was changed. The meetings were structured into three separate meetings as follows.

A daily S1 meeting for the day-to-day operational issues where the production foremen could discuss production targets, quality incidents, scrap and waste as well as all the various downtime occurrences. The waste elimination team was also there to assist with the implementation of the agreed to projects.

A weekly S2 Coordination meeting was put together where the Assembly and machine shop activities were discussed. Production scheduling, materials planning and all the support functions would participate in this meeting. The discussions revolved around the requirements of the customer and the coordinated efforts of the internal customers.

Lastly an S3/S3* meeting discussing the various measurement criteria within manufacturing took place weekly on a Monday. The previous week's customer delivery dates from Assembly, due date performance in the machine shop, scrap results per section, status and works orders, manufacturing costs relative to volume, inventory days and inventory accuracy were discussed. The participants here were the production foremen, the waste elimination team and some of the engineering support staff who were also now being measured by a common set of criteria.

### 4.3.3 Conclusion

The time and appropriateness of using VSM to the detail that would have been appropriate was not possible. The process of thinking about it was given and found to be very useful.

## 4.4. USING THE SCIENTIFIC METHOD IN MANAGEMENT

A variety of statistical studies were conducted on the capability of various aspects of the manufacturing process. The action research project was particularly thorough where entire manufacturing processes were evaluated using the scientific method and S.P.C.

The following feedback from the action initiatives contributes to the formulation of the theoretical framework for manufacturing management in South Africa.

### 4.4.1. Awareness of the Mindset for High Volumes

The drum cell scientific analysis back in March 1998 unlodged the mindset that if ASTAS continued to do things the way they had done them in the past they might not make it. The brake carrier product due to the fact that it had been running for four continuous months with a successful on-time delivery of good quality products in April-May-June. Additionally in July double production was achieved. This only emphasised the high volume mindset required. However the real insight came when the rocker arm's long-term requirements of 150 000 units per annum meant that 700 needed to be produced daily through four processes.

The insight was that the new 24-hour 6 day a week shift, with continuous analysis of the process to uncover opportunities for improvements, and fully completed S.P.C. plot sheets, with high volume tooling and insert back-ups was realised by the foreman and the team of that section. Delivery to a car engine plant requires a disciplined approach, commitment from all and absolute attention to detail. Part of this is the full acceptance and successful implementation of a new shift pattern to ensure 24 x 5 or 6 day a week volume production.

The strategy to achieve high volume export orders became a reality in pockets of the plant. The communication and picture painting of the future slowly crystallised. The high volume components began to be produced.

### 4.4.2. Assessing the Process

Many times it was assumed the processes were capable, the machine could keep size, the tooling and fixturing capable. However these were assumptions most often taken by engineering. With manufacturing documenting reality it was soon proven, but after much disagreement, that nothing should be assumed. Every resource had to be statistically assessed to be capable, i.e. fixturing, machining, measuring, equipment and processes. All future new projects would have to have full capability studies done upfront and where this was not possible the balance would be done in pre-production runs where sufficient time and where a cross-functional project team fully operational, implemented this. The entire set of resources and processes had to be proved capable as if in production—not simulated in any way.

### 4.4.3. Machine Capability

Due to the insight as given in 4.4.2, Capabilities were done on each machine ahead of the being allocated to volume production.

### 4.4.4. Poor Communication

The working relationships particularly between the engineering and the manufacturing department took strain. The arrogance of Engineering knowing better, creating unsubstantiated standards and deciding on processes, etc, without manufacturing involvement in a cross-functional way came to a head. Manufacturing documented, analysed, and using a reality based approach showed the inadequacies of this.

### 4.4.5. People Issues

At an overall level the past authoritarian management styles and the respondent submissiveness, 'do as I'm told,' non-thinking, non self-responsible cultures were very difficult to eradicate. With a reducing sales order book and retrenchments and an uncertain future the process of building continuous learning in a supportive environment, was very difficult. However with a self-learning approach and awareness, that to make an error or achieve success/progress, in a supportive environment started to build a committed workforce. Regular sharing of the company's strategies for the future and gains of the export order book built a level of trust for the future.

### 4.4.6. Insufficient Upfront Planning

On reflection of the progress made it was clear that insufficient up front planning was a core theme. Whether this is with customer specification negotiations or F.M.E.A's on new processes or detailing every step of a new production introduction. The realisation that it would pay healthy dividends was acknowledged.

### 4.4.7. Conclusion

The recognising of the manufacturing challenges to support the strategic capabilities was beginning to be achieved. However the early recognition of the wider environmental influences to achieve the strategic capability had not been achieved.

Formulating the problems was half the battle. Developing an inquiring and questioning approach and testing assumptions, particularly those based on past experience was absolutely necessary.

With the operational capability being tested and the strategic capability not yet achieved, the scenario planning process became the absolute focus.

## 4.5. SCENARIO PLANNING FOR ASTAS

### 4.5.1. Developing the Business Idea

The developing of the business idea for ASTAS was achieved by first establishing the organisation's core competencies. This was undertaken by a brainstorming exercise using a S.W.O.T analysis. The S.W.O.T analysis was then critically analysed to determine the organisation's competitive advantage. The competitive advantage after being processed was determined to be *a **high technologically flexible, amortised manufacturing process capable of high volume production.***

The competitive advantage was studied to understand its meaning. The next phase was to ask the question *what do we have to do to meet the promise?* This question was debated, and defined as ***the continual supply of products at globally competitive quality levels and low cost to offshore markets.***

This simple statement has far-reaching implications. It means that export orders will have to be obtained to provide the volumes required. The product had to be of world-class quality standards at a low globally competitive cost. This in simple terms means that costs and cost reduction activities must firstly be put into place. This is due to the fact that the first step in entering the world market is cost competitiveness.

However cost leadership leads to short-term gains only. Long-term survival would depend on creating new partnerships and products.

Now that the competitive advantage had been clearly defined, the next step was to ask the questions *what are the unique factors that allow the organisation to exploit its competitive advantage?*

*Why are other competitors unable to emulate them? What makes it difficult for the competitors to emulate them?*

The three questions were then debated at length, and the following statement was formulated:

***World capacity constraints and nuisance volumes to world players could result in a global volume spin-off to ASTAS. The organisation's flexible manufacturing facility is already amortised, and has had success with small export orders.*** The competitors would face difficulties due to the costs required to set up machinery, train a workforce and time to market.

Having agreed that the competitive advantage that had been identified would be able to withstand competition. It became necessary now had to develop an influence diagram that depicted the business idea clearly.

The next step was to identify the company characteristics causing the competitive advantage. Arrows were then drawn from the source to the competitive advantage. The process then continued by identifying what caused these sources to exist. Arrows were then linked from the cause to the sources. This process continued until all the causes had been exhausted.
A number of recursions of this process were followed until a simplified, cleaned up business idea emerged. This is shown in figure 4.1 below. The business idea development process provided a structured, holistic, strategic plan for the future of the organisation. The business idea when completed, provided a step-by-step approach to the future survival of the organisation.

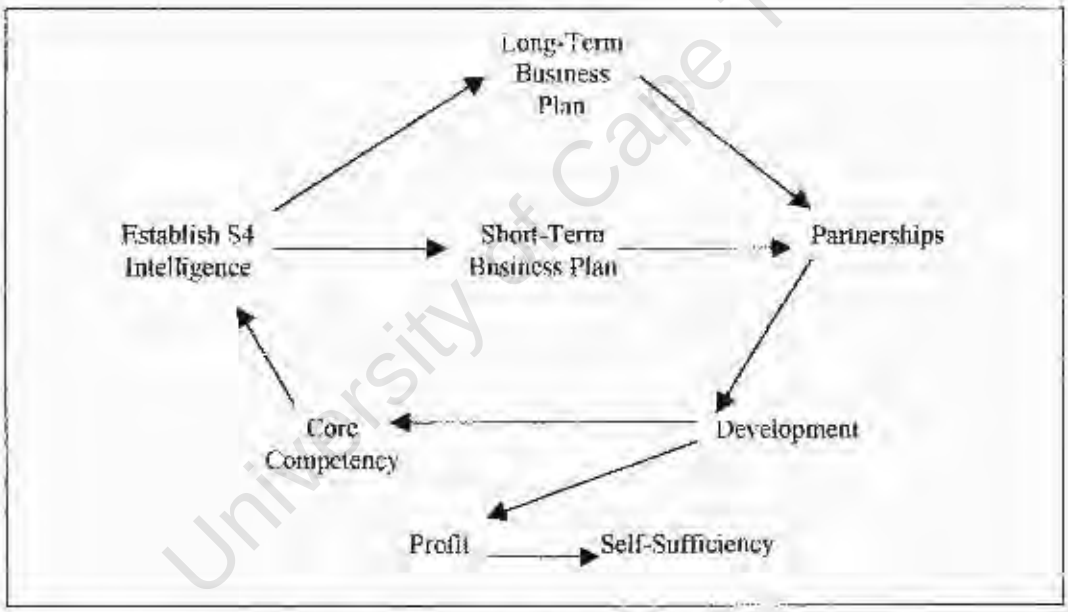



Figure 4.1: The Defined Business Idea for ASTAS

The global markets must be targeted. Costs had to be reduced to ensure competitiveness to enter the markets. This would attract new partnerships, profits and long-term survival. The business idea provided a strategy for the future in both the long term and the short term.
The business idea was based on the current environment and needed to be reviewed and amended to reflect changes identified in the environment as detected and monitored by the system four intelligence functions.

### 4.5.2. Assessing the Competitive Positioning vs. the ASTAS Core Competencies

The next process was to assess this strategy against the core competencies of the competitors.

| COMPANY | CORE COMPETENCIES |
|---|---|
| ASTAS | • High tech product making ability.<br>• Flexibility due to underutilised capacity.<br>• Amortised assets resulting in low cost production.<br>• Manufacturing process capable of high tolerance automotive components. |
| OEM's | • International links – can source from family network based on economic advantages. |
| EATON | • International links advantage (gearbox only) |
| MAN/MB | • International links advantage (drive axle only) |
| ADE | • Recognised as best volume foundry in South Africa with machining capability. |
| Direct Importers (Pirate spares) | • Low variety – fast-wearing parts – capable of being produced in high volume<br>• International links for marketing and distribution |

Table 4.2: Competitor and ASTAS Core Competencies

### 4.5.3. Towards Competitive Positioning

The next step was to analyse the competitors in more detail and to rethink the nature of ASTAS' business and its strategies to be pursued. This is shown in Figure below.

Closing Notes on Competitive Positioning

Using the key ingredients within the ASTAS business idea of capacity, capability and flexibility (CCF) as a base and comparing these distinctive competencies to ASTAS' distinctive competencies of 'flexible' and 'amortised' assets became the foundation of the business idea and the strategies that follow.

| COMPANY | DISTINCTIVE COMPETENCIES | | | | | |
|---|---|---|---|---|---|---|
| | High Tech | Flexible | Amortised | High Volume High Tolerance Automotive components | Interna-tional links can Source in Family Network | Low Variety fast wearing parts (high volume) |
| 1. ASTAS | SS | SL | SS | SL | W | W |
| 2. OEM's | SS | W | W | SL | SL | W |
| 3. EATON | SL (Gearbox only) | W | W | SL | AL (Gearbox only) | W |
| 4. ADE | W | W | W | SL | W | W |
| 5. MAN/MB | SS (Axles only) | W | W | W | SS (Axles only) | W |
| 6. Pirate Spares | SS | W | W | SL | SS | SL |

SS = strong/short term SL = strong/long term W = weak

Table 4.3 Distinctive Competencies Compared

The amortised 'cost advantage' of the reduced cost structure and the flexible, 'ability to turn around products quickly to satisfy customer requirements' are the key distinctive competencies that ASTAS needs to take advantage of in the immediate term.

Once the capacity has begun to be utilised, then the distinctive competencies vis-à-vis the competitors was likely to change. The desire to build key partnerships and become part of the global network, and then a system supplier of sub-assemblies to global OEM's would become the distinctive competency for the longer term. This would lead the business idea out of the first phase of cost competitiveness, utilising capacity and its in-built flexibility, to the second phase of building partnerships where the key ingredients are the joint designing of systems and the sub-assemblies that go with this to the OEM's.

Having grown from the cost competitive focus to developing the new partnerships that optimised the utilisation of the available capacity, profitability would start coming back into the business.

It should be mentioned that during this time the name of ASTAS as a reliable supplier will have been built up, and a combination of the partnerships and products mix, that suits the capacity and capability of the plant would be generating the profits for future growth. It would also be building the bank of information from the intelligence function (S4) that was limited in the early days of the development of the business idea.

The last stage of the development of the business idea would unfold where the increased profitability base would allow for additional investment into improved technology, thus leading the organisation away from survival, to growth into a future that would be embedded in the partnerships with local suppliers and offshore customers. Hence becoming a genuine profitable partner in the global chain, of the global automotive industry, and staying in the mainstream of technology and the market/distribution network.

### 4.5.4. Scenario Development

In this section four scenarios were developed. Scenarios are constructed stories about the future. Each scenario represents a distinct and plausible outcome, or sequence of events.

The purpose of scenario planning is not to predict the future, but rather to show how different forces can manipulate the future in different directions, how different forces can affect the business environment that the company is trading in. It is important to realise this, as this process helps to identify those forces, if and when they happen. The utility of scenario plans lies in its ability to anticipate the future. When this is accomplished, the ability to better respond helps what they might mean and us to understand the uncertainties that lie before us. It helps us to anticipate what our response will be to those uncertainties if they occur.

The four scenarios that were developed are given in appendices 21-24.

### 4.5.5. Recommendations for Implementation

The first step of implementation must be to concentrate on total cost reduction activities, all areas of waste must be eliminated or reduced. Cost effectiveness is the entry-level requirement required to tender for additional business specifically as the world markets will be approached, to attract volumes due to global spillage?

The second step will be to establish an intelligence function to tap information from the global areas, to identify global spillage and possible business.

The third step will be to attract new partnerships with global manufactures to obtain additional order book, distribution networks and investments.

The fourth step is to invest the additional profits generated back into the organisation, in the form of improved technology and skilled employees. This will provide long-term survival.

The business idea could become vulnerable, because over time environmental and competitor competencies change. The weak link in the organisational capability is the intelligence function. The intelligence function must be strengthened and enabled to closely follow and monitor the environment.

4.5.6 Conclusion

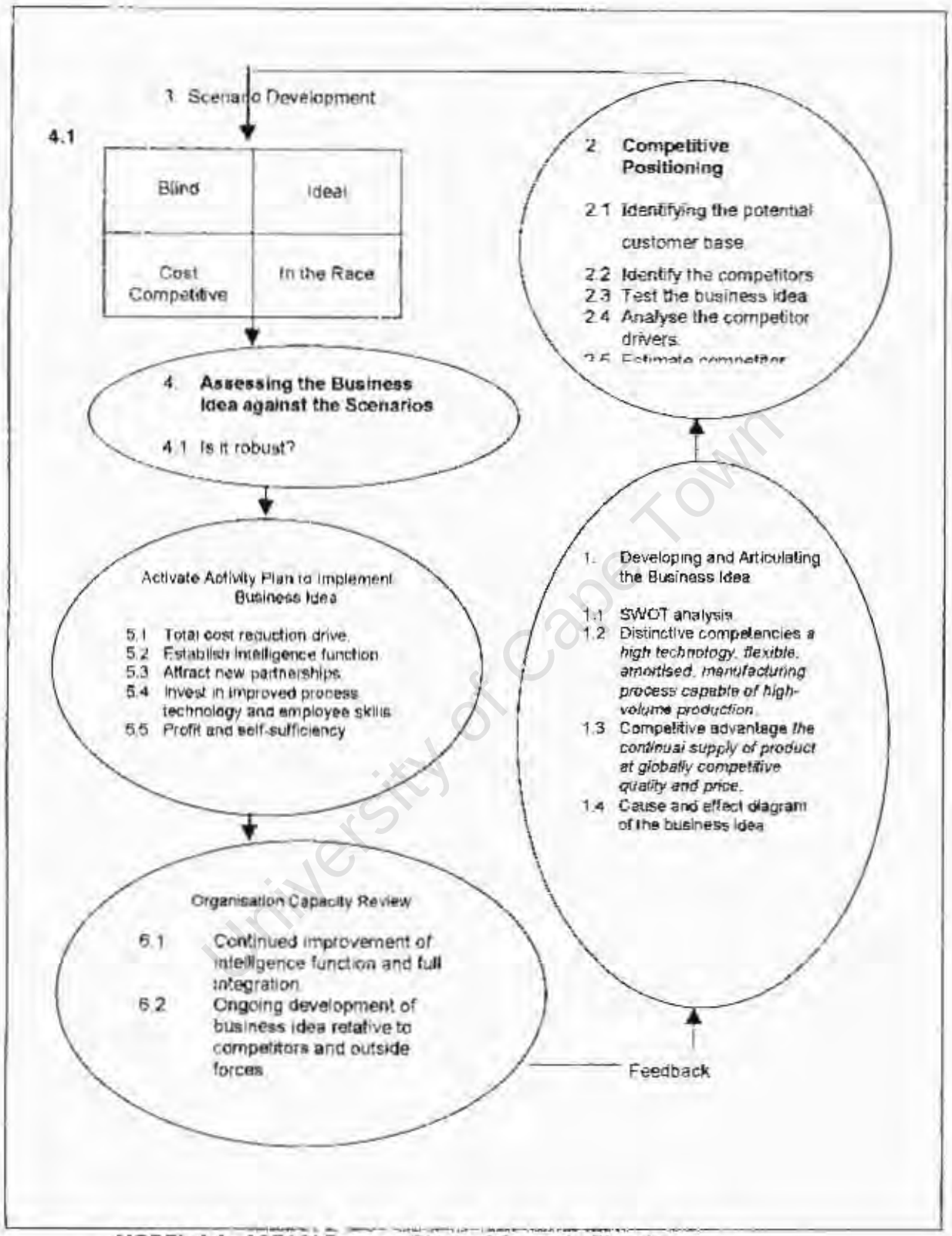
This process has taken ASTAS and theoretically assessed how ASTAS could particularly create a strategic future for itself.

The steps below were followed:

1. Understanding the fundamentals of ASTAS' business.
2. Developing and articulating the Business Idea for ASTAS.
3. Assessing the competitive positions, relative to the competitors.
4. Scenario development.
5. Choosing the strategic options and activity plans for ASTAS that will take it into the future, beyond survival and to profitable growth.

The best way to summarise this process is to show it in the form of a diagram. The model is diagrammed for the process followed in dealing with ASTAS. This is shown in Figure 4.2, ASTAS' Process Steps of Scenario Planning.

Much good thinking work was done but it was never implemented or debated for it to be considered important.




**MODEL 4.4: ASTAS' Process Steps of Scenario Planning**

## 4.6. IDENTIFYING AND NAMING THE RELEVENT SYSTEMS, THE ROOT DEFINITIONS AND THE CONCEPTUAL MODEL

A further process using SSM's identification of the relevant systems that would help ASTAS achieve its strategic and operational capabilities were processed

### 4.6.1 Introduction

Against the various literature authorities a brainstorm of the key relevant systems that ASTAS needed to achieve its goal was completed. This process has been an ongoing one and as a result the relevant systems chosen were adjusted from time to time, however the essential ones did not change.

The key relevant systems are named below:

- establishing and constantly reassessing the Distinctive Competencies and the Business Ideas of ASTAS as a company, in order to maximise the value overlap with customers;
- continuously building the market intelligence (VSM S4);
- realigning to an appropriate costing system;
- systemic leadership towards building external and internal partnerships;
- the implementation of a quality management system;
- the use of VSM to restructure the company;
- implementing world-class manufacturing.

### 4.6.2. Compiling Root Definitions for Each of the Relevant Systems

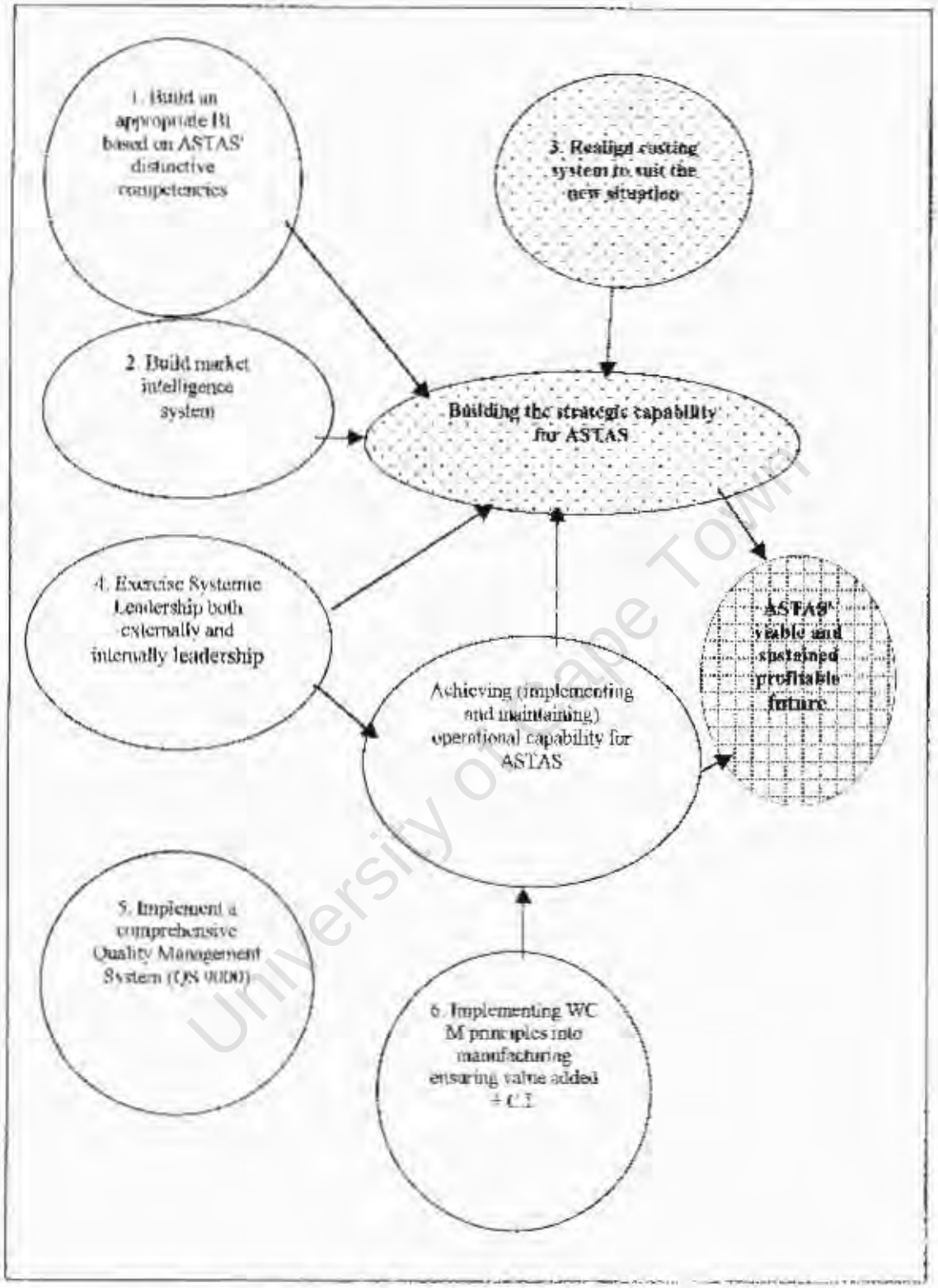
Each of the relevant systems were processed and the root definitions compiled. In order to arrive at the root definitions the integrated C.A.T.W.O.E. and formal systems model was used.

### 4.6.3. The Conceptual Model of the Key Relevant Systems

The building of the conceptual model has shown in Model 4.6 and the key interrelationships between the relevant systems support the premise of the three fundamental problems of strategic capability, operational capability and systemic leadership.

| Relevant System Name | Root Definition |
|---|---|
| Distinctive competencies and Business Idea | Establishing and constantly reassessing the current and potential distinctive competencies of a company and the developing of the Business Idea of the company in order to establish and maintain the competitive positioning so as to maximise the value overlap of ASTAS' current and new customers. Developing scenarios to assess the strategic options available for action. |
| Market Intelligence System | Acquires and processes business economic, technology, environmental, automotive industry and appropriate information that is relevant to ASTAS. Understands the needs and requirements of current and potential customers as well as the competitors. Processes the information acquired to maximise the value overlap of the company's value-added products and services with those of the customers. The end results are options of market intelligence. |
| Appropriate Costing System | The need for an accounting system to maximise the rate/speed of processing and selling product from raw material to banking debtors. Optimising the product material costs and operating expenses (the money spent in turning product material into sales). Optimise the product pricing process. |
| Systemic Leadership | Assess the value of current and future business relationships both external and internal to the organisation for strategic positioning purposes so as to maximise the matching competencies of the various partnerships. |
| Quality Management System | A system that ensures the quality systems and processes are fully implemented so that product quality is achieved and maintained while promoting a continuous improvement culture. |
| VSM in Operations Management | The managing of operations by means of a VSM where S5 Policy Making Processes, S4 Intelligence Gathering Processes, S3Control Process, S2 Coordinating Process and S2 Action Processes are coordinated into a system and managed the VSM way. |
| World-Class Manufacturing | Holistically looking at all the operational issues that ensure manufacturing capability and improvements so that produced quality, customer responsiveness and sustained profitability and future viability of the company are achieved. |

Table 4.5: The Conceptual Model of the Major Relevant Systems for ASTAS




MODEL 4.6: The Conceptual Model Showing the Key Relevant Systems and the Interrelationship of the Parts

## 4.8. WHY DID ASTAS FAIL?

ASTAS was liquidated on 17th May 2000. The surface reason for this was that the Indonesian purchaser did not come up with the purchase price. As the company had been handed over to the new purchaser on a suspense of sale agreement ten and a half months prior, the only process that M&R had available to them was to liquidate in order to retain their asset.

The underlying reasons however lay in the actions of the senior management two to five years prior to that time.

Mitroff gives the five major reasons why problems are not solved correctly. These reasons are given below and are extremely appropriate to ASTAS.

| | |
|---|---|
| 1. Picking the wrong stakeholders | Involving only a small set of stakeholders in the problem formulation. |
| 2. Selecting too narrow a set of options | Selecting a limited set of problem options. |
| 3. Phrasing the problem incorrectly | Using a narrow set of disciplines, or business variables in which to express the basic nature of a problem |
| 4.Setting the scope of a problem too narrowly | Drawing the boundaries or scope of the problem too narrowly narrowly; not being inclusive enough |
| 5.Failing to think systemically | Focusing on a part of a problem instead of the whole system; focusing on the wrong part and ignoring the connection between the parts and the whole. |

Fundamentally the prime reason was management's failure to transform itself and adopt the new role required of management as described by Deming.

The key factors in the failure were.

1. The inability to the read the contextual environmental changes and the lack of marketing intelligence to asses the future threats and opportunities.
2. With this lost relevancy the second was the inability to reposition ASTAS and create a new strategic capability based on ASTAS's distinctive competencies.

3. The inability to create an operational capability that could have placed the manufacturing operation as an available world class manufacturing unit ready to consistently produce cost competitive and quality products to a global markets timeously.
4. The inability to build critical external and internal partnerships for ASTAS.

Given the extensive various theoretical inputs and the actions for implementation and the reflecting why they failed the writer has grouped other specific failures according to the theoretical framework as given by Deming, using the PSoK.

Knowledge

- Not using a theoretical base to asses various problem issues
- Believing that experience was the only basis of knowledge
- The arrogance, 'know it all' attitude and that there was no need for new knowledge
- Not surfacing and unlocking the various mental models of the past and through proper advocacy and debate arrive at a common mental model of the issues at hand.
- With the old mind set still in place the continued analysis of the problem from the incorrect perspective.
- Lack of market intelligence VSM S4
- Not using learning as a basis for formulating the future.

Systems

- Failure to think systemically
- Not having a holistic approach.
- No feedback loops in place.
- No use of the systems models to portray the systemic nature at the variables at play and the interrelationship of the parts.

Variation

- No systems installed to manage requisite variety.
- No real understanding of SPC and getting systems under control
- No monitoring of the key variables.

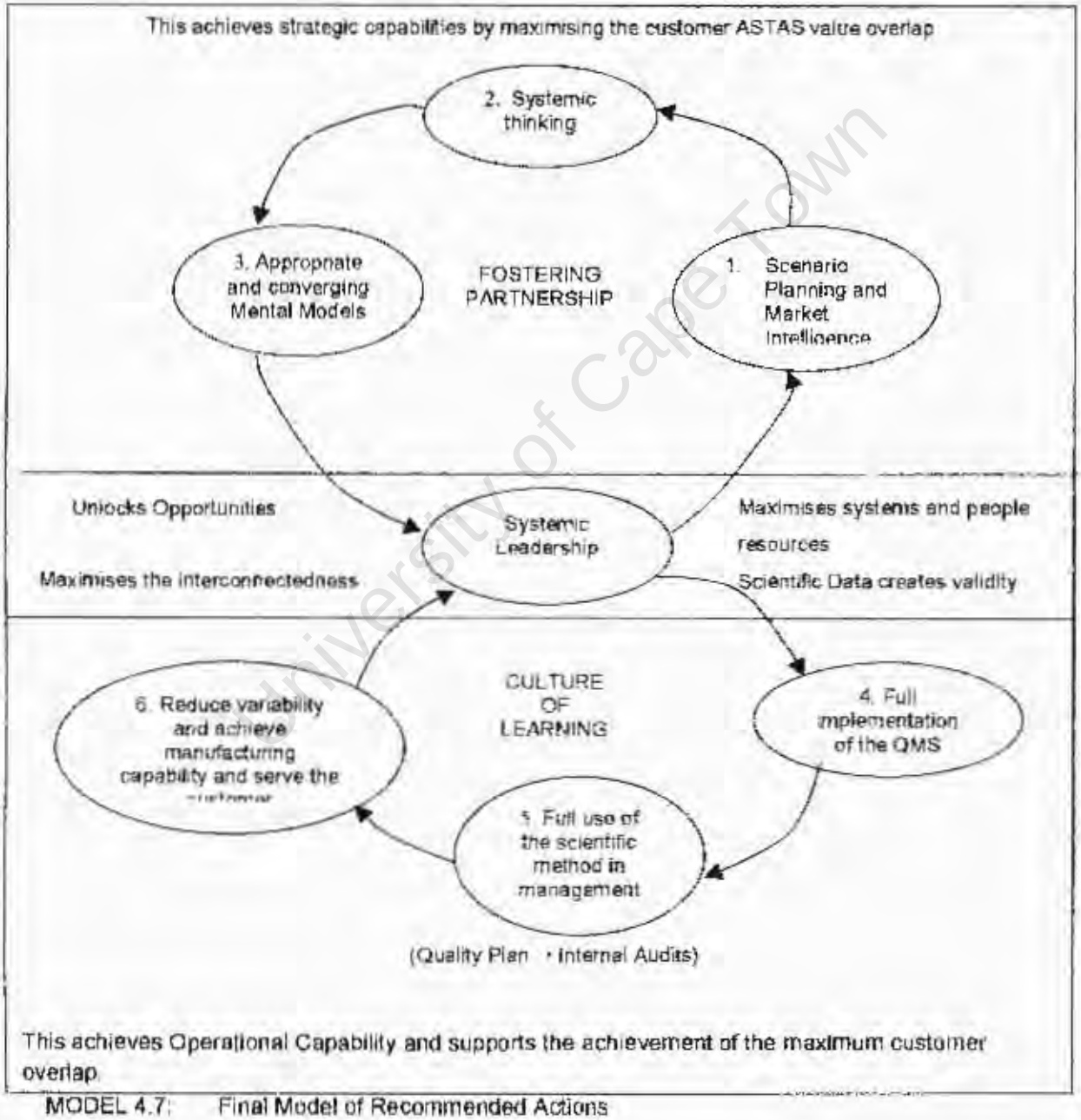
Psychology

- Picking too few and the wrong stakeholders.
- Arrogance leading to no desire to build strategic partnerships.
- Crisis management and therefore no time to think.
- The inability to accept change.

Methodology

- Selecting too narrow a set of options
- Not using any methodology at all.
- Not using the scientific method.

A final model is given below showing the actions that should have implemented. The written recommendations are reflected in Appendices 25 and 26




MODEL 4.7: Final Model of Recommended Actions

# CHAPTER FIVE
# RECOMMENDATIONS

## 5.1 INTRODUCTION

The inputs used in the formulating of the recommendations come from the previous chapters. The case study was the company ASTAS, previously a drivetrain supplier to the HCV OEMs and latterly a component manufacturer is summarised in chapter 1. The changing business environmental context facing the South African manufacturers in the 1990s is also covered in chapter 1. The problem statement claim indicating the need for the transformation of management as a prerequisite for survival is covered in chapter 2. The theoretical framework based on Deming and supported by other relevant theorists whilst being driven by an integrated research methodology is fully covered in chapter 3. The mainly theoretical planned interventions of which many remained untried due to the extraordinary circumstances facing ASTAS is dealt with in chapter 4.

The theoretical model 3.1 recommended provides a framework for the transformation of companies in times of turmoil. Deming showed the world by taking the Japanese to the point of being an economic force to be reckoned with.

The process that will be followed is to take the theoretical framework and reformulate it into a set of recommendations, for use in manufacturing in South Africa.

The issues facing South African manufacturers during the 1990s were

- dealing with change and the fast-moving global environment
- dealing with the increased complexity of matters and the variety that goes with it
- dealing with how to unlock the mental models and creating a new learning approach to business
- showing the need for a scientific method approach to the gathering of data and reformulating it into knowledge
- ensuring that a holistic, systemic view of the situation is reviewed
- to think systemically
- being able to reframe a company towards a relevant strategic and operational future
- structuring organisations as systems, and reorganising the roles of managers
- needing to predict in the uncertain global world
- developing a holistic practical application model that blends the areas of strategic and operational issues

## 5.2. RECOMMENDATIONS

### 5.2.1. A Transformation Process

The overarching recommendations come from the need to develop a process, a transformation process. This is shown in model 1.1 in the front matter. It gives the important steps

- context evaluation
- problem formulation
- appropriate theory
- planned interventions
- action
- reflection

It provides the process to analyse the context so that the problem is properly determined. Given the problem properly determined appropriate theory is found. This assists in formulating the planned interventions. The planned interventions generate options for action. Once the actions have been monitored effectively and reflected upon, learning and improved management practices are gained. This then starts the cyclical process to begin again. Using this approach gives meaning to the problems and the solutions and ultimately allows for predictions to be made even in the most complex and dynamic circumstances.

### 5.2.2. Management's Commitment

The first recommendation is management's commitment to adopt a new philosophy of management. This is any easy statement to make, but it is an absolute necessity and cannot go unsaid. This was the second of Deming's fourteen points. Deming (1982: 24). "Create constancy of purpose for improvement of product and service". An unshakable commitment to the transformation of management is required. A commitment stretching for the next 20 years and more with a daily recommitment to it. This is a philosophical commitment to perseverance with rigour. The majority of Deming's work is focused on management's need to realise they have a problem in themselves and as they create the frameworks and systems for organisations to operate within, it is their change of heart that needs to come early on. Deming (1982:24)" This action is a fundamental commitment of management to think ahead for sustained growth of the organisation by maintaining a competitive position in the market place through innovation of product and service, unshakable commitment to quality and productivity, and the allocation of resources to product research and employee development". This is done while maintaining and improving the day-to-day management of the quality and output of the product and/or service. It is

improving the balance between the problems of the future and today's organisational problems. Too much time is spent on crisis management and too little on keeping the organisation in business. The Scenario Planning process and the VSM are particularly pertinent as part of this overall recommendation.

### 5.2.3. The Need to Use an Integrated Research Methodology

The cycle of the integrated research method showed in model 3.25 and in the Table 3.26 add real value. This process allows for a systematic and thorough method of achieving a scientific problem solution. Each step provides a step towards a solution and if done properly achieves movement towards a common mental model and the use of systemic thinking. The process itself is transforming in its nature and some of the techniques provide a systemic approach.

### 5.2.4 The Using of Cybernetics

It is recommended to open the process with the use of Cybernetics in management. This is best displayed in model 3.2. The role of cybernetics in management. Essentially it acts as an awareness process towards the understanding of systems thinking and a framework of dealing with complex and dynamic business problems

### 5.2.5 Problem Formulation

The next step is to formulate the problem concisely using good logic that can withstand to be tested in practice. In the case of ASTAS it was formulated and is shown in Figure 2.7. The gathering of the assumptions, concerns and questions via the research methodology should have taken place. The use of the 'rich picture' is particularly helpful.

### 5.2.6 The Fundamental Theoretical Recommendation is the Framework of Deming's PSoK

This is shown in model 2.6 and covers the four fundamentals that management need to achieve. The first is the building of organisational knowledge. It is the process of accumulating knowledge at all levels in the organisation and doing it quickly and smartly in this dynamic world we live in that is going to allow organisations to survive and grow into the future. The second is the understanding of the organisation and its context as a system. The third is the understanding of variation and the statistical nature of systems and the world and to manage accordingly. The last is to build an internally sustainable motivation amongst all employees. The writer believes that this can only be done through systemic leadership. Each of the four parts of PSoK will be covered

as separate items of recommendation. This is complemented by other theorists and is shown in model 3.1.

### 5.2.7. Theory of Knowledge Recommendations

There are a number of recommendations regarding knowledge:

- The claim to knowledge shown in model 3.3 is important to understand as is the scientific method shown in model 3.4.
- As a backdrop to gaining knowledge it is important to understand the formulation of mental models as well as the process of learning. In particular figure 3.7, which shows learning and its influence on risk, decision making and prediction and finally the double loop learning process, which helps with reframing theory in recursive steps.
- Should the need to gain the knowledge of a new relevancy for the organisation be necessary then it is recommend using the Scenario Planning process. In particular the formulation of the business idea. This is shown for the ASTAS company in model 4.1. The assessing of the distinctive competencies and competitive positioning are also extremely useful processes. They are shown in Models 3.1. And 4. 2. Respectively. This recommendation is the same as Deming's first point 'Consistency of purpose to stay in business', being one of management's most important responsibilities. Deming(1982:25) 'Problems of the future command first and foremost consistency of purpose and dedication to the improvement of competitive position to keep the company alive and to provide jobs for their employees.'
- Two further elements of knowledge are covered in the VSM, these are the intelligence and the policy making functions. The writer believes the are a part of the knowledge of the organisation. They are shown in the model 3.15, the detail in section 3.9.

### 5.2.8. The Theory of Systems Recommendations

The concept of the Theory of Systems builds from the cybernetics recommended earlier. The recommendations are the understanding of systems as an introduction, moving on to systems thinking and the TSI approach. In particular the VSM in its applicability to managing organisations. And finally the issue of recursion is also specifically covered.

- The concept of systems is covered in model 3.11. And acts as an introduction.
- Systems' thinking if used effectively allows the organisation to
  1. Observe and describe situations systematically
  2. Use it in problem solving

3. Manage reality by designing in systems terms and
4. Use it for classification. A complete suite of systems thinking interventions have been developed by Flood and Jackson (1991) called TSI, Total systems Interventions. There are a number of systems processes offered.

- The VSM model in particular is recommended. This is shown in its whole in model 3.12. And is discussed in section 3.9. The aspects of intelligence and policy have already been recommended and need no further mention. The aspect of requisite variety will be discussed under the variation section. The issue of recursion should also be particularly recommended. This is covered in model 3.19

Deming's points nine and ten deal with systems. Point nine recommends the breaking down of departmental barriers. Whilst point ten suggests the maximising of the total system at the exclusion of subsystem optimisation. Deming (1982:64) 'Teamwork is sorely needed throughout the company. He that works to help other people may not have as much production to show for the annual rating as he would if he worked alone'. A further quote from Deming regarding the systems approach. Deming (1994: 50) "It is management's job to direct the efforts of all components towards the aim of the system. The first step is clarification: everyone in the organization must understand the aim of the system, and how to direct his efforts toward it. Everyone must understand the danger and loss to the whole organization from a team that seeks to become a selfish, independent profit centre.' Deming (1982:66): "Do it right the first time." A lofty ring it has. But how could a person make it right the first time when the incoming material is off-gauge, off-colour, or otherwise defective, or if their machine is not in good order, or the measuring instruments trustworthy? This is just another meaningless slogan, a cousin of zero defects." We, in South Africa, have heard and seen this slogan often. This is not the worker's job it is management's. It is management who put the system together with all its control points. Management needs to learn that they should understand the special causes of the system and deal with them. Too often the workforce are blamed for what is management's responsibility

### 5.2.9. The Theory of Variations Recommendations

Management's most important role is to keep the systems in control and to contribute to continuous improvement of the system. The recommendations that will be covered under variation are firstly being aware of it and the manager's role in it and then the issue of requisite variety.

- Variation is an important link between knowledge and systems. It is the product of any system and has to be recognized and managed as such. It is covered in 3.11.1

Management's role in managing variation in the organisation is covered Table 3.20. And is an absolute necessity.

Lastly the issue of requisite variety is covered under VSM, however it is a form of managing variation and the writer is recommending it as such. It is covered in model 3.14

Deming's points three, four and five lend themselves to the theory of variation. Point three propagates building quality into the product the first time. Point four recommends single source supply, yet another reduction in variation. Point five bridges both variation and systems and recommends the maximisation of the total system similar to the point ten under systems. — "Cease dependence on mass inspection" Regarding Deming's point three, One hundred per cent Inspection is equivalent to planning for defective product and service. Inspection to improve quality is too late and costly. If the product leaves the supplier defective it is too late. So what can be done? Implement a fully practiced quality management system that ensures all the key relevant processes (manufacturing, administration and service related) have had a capability study completed. This establishes the capability and the control/not in control status of the process. Once statistical process control (SPC) measurements have been put in place, for the appropriate processes then there is only a need for in-process quality inspection.

Some of the actions related to a fully practiced quality system that are of key importance are:

i. Discussing and understanding the customer's product requirements upfront in the form of customer reviews.
ii. Completing failure mode effect analysis (FMEA) before production commences.
iii. Ensuring that process capabilities are fully established before accepting the pressure to run full production (use of controlled runs).
iv. Conducting continuous capability studies to improve manufacturing capability and repeatability (ongoing improvement).

Point 4 of Deming's 14 points—Deming (1982:31) "End the practice of awarding business on the basis of price tag alone" Price alone as a criterion for supplier purchases will develop very weak links in the supply chain of your organisation. Deming (1982: 33) puts it this way: "Purchasing departments must change their focus from lowest **initial** cost of material to lowest **total** cost." What this means is that long-term relationships with few key suppliers are chosen because, given all things such as delivery delays, quality returns, warranty claims, etc., they are the most cost effective and efficient as a whole. It boils down to reducing variety into the inputs of your organisation.

Point 5 of Deming's 14 Points— Deming (1982:49) "Improve constantly and forever the system of production and service. Goldratt's theory of constraints (TOC) gives a better understanding of this. Against the background that most business can be viewed as a linked system of processes that transforms inputs into saleable outputs, TOC then believes that the weakest link—the constraint—needs to improve the entire system.

TOC's prime steps are:

i. to identify the weakest link, the constraint
ii. to try not to put the chain under load
iii. to concentrate efforts on improving the weakest link
iv. to eventually, with the improvement of the weakest link, shift the need to find the following weakest link. And so the process continues.

To summarise TOC is a specific way of managing operations and needs a TOC set of principles. These TOC principles are as follows:

- increase throughput (sales)
- decrease operating expense (overhead costs/fixed costs)
- decrease investments particularly inventory
- improve operations so that existing resources can handle diversity and volume
- provide form more pricing flexibility as product costs are lower than conventional absorption costing

Deming (1982: 50): "Is every job done better than the one before? Is there continual improvement in methods to understand better each new customer's needs? Is there continual improvement of materials, of selection of new employees, of the skills of people at work on the job, and of repeated operations?"

5.2.10. The Theory of Psychology Recommendations

The responsibility to the sustaining of a committed workforce is management's ability to provide systemic leadership. Peter Senge is the main contributor of this. Other aspects that are recommended are managing change, the development of key partnerships and Deming's role of the manager after transformation.

- Systemic leadership is covered in 3.10.2. Senge believes that the three issues of the nature of causality, policy resistance and leverage points are extremely important to modern managers. The detail is given in this section.
- Managing change is very briefly discussed in 3.10.4.
- The building of key partnerships with all the stakeholders is recommended.
- A further recommendation in the area of psychology is Peter Senge's ladder of inference. This is covered in model 3.5.
- Lastly the role of the manager after transformation as suggested is an absolute recommendation. This is covered in 3.10.3. in chapter three.

There are a number of Deming's points that fall into the Theory of Psychology. The first three cover the area of leadership. Points seven and eleven require the adoption and institution of leadership and the treating of employees as individuals and not as numbers. Point eight, is often the only one that is commonly remembered, is to drive out fear. Deming (1982: 54): "The job of management is not supervision, but leadership." It is about removing barriers for employees to optimise their inputs, it is about developing their full potential via training and self-improvement, it is about systems thinking towards systems optimisation and it is about intrinsic motivation for sustained employee input. Deming (1982: 64): "Teams composed of people in design, engineering, production and sales could contribute to designs for the future and could accomplish important improvements in product, service and quality of today, if they could work without fear of taking a risk."

Two further of Deming's points cover learning. Point six calls for the ongoing on-the-job training whilst point thirteen calls for the provision of a climate of self-improvement. The writer believes that these last two points are the result and response of the employees to what the climate of good systemic leadership would bring. A commitment from all employees, point fourteen and a pride of workmanship, point twelve.

As a final reference to Deming and the transformation process Deming recommends what a manager's job should be (1994: 50-59). This in a way summarises the transformation process. This in some way duplicates the fourteen points and the managers role in 3.10.3.

1. Provide the organisation with an ongoing aim and future and with this provide the benefits for all the stakeholders involved (customers, employees, suppliers and investors). The aim has to provide (1994:51): "...a clarification of values, especially on the choice between possible options." This is concurred with in the business idea and competitive advantage to achieve total systems optimisation in scenario planning.

ii. Manage and coordinate the efforts of all the component parts of the organisational system. This includes the resolution of conflicts, and removal of barriers to cooperation.

iii. Communicate in the writer's opinion via the scenario planning workshops the aim and values of the organisation in the formulation of the Business Idea, Distinctive Competencies and Competitive Advantage

iv. Via constant scanning of the environment chart the course of the organisation through the influences that the global economy places on the organisation. The S4 intelligence function in VSM and scenario planning is a superb example of this.

v. Prepare the organisation and its employees for life-long learning.

vi. Influence the boundaries or environments to better serve the aim and values of the organisation.

vii. Be able to predict future choices/opinions. Deming (1994: 55): "By understanding a system, one may be able to predict the consequences of proposed changes."

viii. Using systems thinking be able to predict what the customer requires in the future so as to lead new product development.

ix. Expand the marketing opportunities and markets rather than fight for another percentage of market share.

x. Develop continuous feedback loops for continual improvement and continual learning.

xi. To analyse work systemically, Deming (1994: 59): "...the flow of material and information from any part of the system must make the input requirements of the next stage." This is supported by Eli Goldratt's 'Theory of Constraints'.

xii. To realise that in systems there are delayed effects and these should be monitored.

xiii. Ensure that job descriptions specify the inputs and outputs of the job and the contribution each job makes to the whole.

## 5.3. CONCLUSION

The transformation of management successfully worked for the Japanese when they faced a major crisis in their economy. The framework model for the transforming management is based on Deming's PSoK and complemented by other relevant theorists generic enough that it can benefit South African management.

# CHAPTER SIX
# REFLECTIONS AND EVALUATION

## 6.1. INTRODUCTION

Given the context that was described in the 1990s, the year 2000 and beyond will in some respects be not much different. The intensity of the changes may have felt enormous, but the nature of continuous change will go on. The problems will also not go away, unless the recognition is given that thinking/theorising, followed by planned interventions will contribute to learning. This is best shown in model 6.1 entitled Reflection on the Transformation Process. This ongoing cycle of thinking/theorising, coordinated action and learning helps in a scientific way change minds, transform practices and creates meaning. This is what modern day management is all about.

The fundamental reflections follow the steps:

- The need for a fundamental transformation process as used in the thesis is required. This is shown in the model 1.1
- The absolute necessity to formulate the problem in a rigorous and logical way. This is shown in figure 2.7 for ASTAS.
- The need for a theoretical way of dealing with the problem. This has been provided in the form of the two models 2.6 and 3.1.
- Given the ASTAS situation the recommendations shown in model 4.7 are still valid and could be applied generically given the context being similar.
- The recommendations fall into four major categories:
  1. A commitment to a transformation of management practices. These are articulated in the recommendations under Deming's points one and two of his fourteen points
  2. A need for a scientific research methodology (covered in 3.12)
  3. A theoretical model that provides a basis for dealing with the problem
  4. A vision of what management's new practices need to be (covered in 3.10.3)

The reflections need to ask the questions what value has the whole process added to

- The increased understanding of the context
- The increase of knowledge and learning
- The improvement in management practices

## 6.2 THE FUNDAMENTAL TRANSFORMATION PROCESS

The basic transformation process given as the thesis framework is essential. This is shown in Model 6.1 at the end of the chapter. The context determines the problem formulation, and after thinking systemically as well as theorising in an integrated way, one can build a theoretical plan of action for implementation in a coordinated way that also chooses what to monitor. This provides the basis for the transformation of management practices. The circle is closed when the learning becomes synonymous with management's ability to predict the future with greater insight and reformulate the theory for the next cycle of the process.

Change is all around us and is going to continue getting more complex, integrated and more awesome unless a fresh approach and attitude is adopted. The learning process together with an understanding of the formulation, influence and common understanding of the influence of mental models in people's minds is an imperative first step. It needs to be taken to its logical conclusion of organisational learning and learning as a way of being (becoming a way of life).

Management's commitment to this and acceptance that the management sciences, have developed with the globalisation of things and can now offer a wide variety of philosophies, principles, methodologies, tools and techniques also has to be grasped. This new mind set is an imperative first step.

## 6.3 THE USE OF AN INTEGRATED RESEARCH METHODOLOGY

This has been covered in great detail in chapter three and needs no further repetition. Only to say that without applying it in a rigorous the results will not be achieved.

## 6.4 THE USE OF A THEORETICAL MODEL AS A PLAN TO DEAL WITH THE PROBLEM

The integrating and attempting to put together a theoretical model that is built out of component parts inputs given over 2 ½ years of recursive theoretical inputs and real-life applications and reflections on real-life issues has been a mind-blowing exercise.

All the theoretical inputs alone from Handy to Ballé, Senge to Goldratt, Deming to Revans, Jackson and Flood to Clemson, Schulkein to Beer, De Geus to Van Heijden, Bennet and Oliver to Naughton's soft systems approach have been difficult enough to integrate. To think about them

in the Abstract and in a systems way and make a theoretical model ready for application has often been extremely absorbing.

To then take a reality situation and through its analysis get a clear formulation of the problems/issues at hand to achieve practical relevance is a further significant step. To further take both the theory and the practical situations and apply a thought through theoretical and monitored action plan simply starts the process of learning and knowledge management.

The recursion rolls of the learning wheel so as to accumulate experienced knowledge towards wisdom is a struggle and fun process. It has been good. It has been a developing, rigorous and rewarding process.

It is now fundamentally the writer's belief that one has to think and practice your life in a systemic way. It helps to understand and function more effectively. It helps to be more predictive and proactive and to influence the situation around one rather than being 'a victim of circumstances'. It helps to see the whole picture and balance the long and the short terms.

South Africa has been peppered with techniques that have been the flavor of the month type interventions. TQM, 'The Goal', Kobayashi's Keys, SPC, etc. etc. Unless you see Deming's PSoK as a holistic approach of applying the combined elements acting in unison we will remain at the technique level and not reach our full potential. Adopting the philosophical framework and implementing it on a continuos cycle of learning will lead to improved prediction and improved management practices.

## 6.5 THE FINAL OUTCOME

The final outcome is to ask the questions whether this process adds value to

- Increasing the understanding of the problem context
- Increasing the value of using theory as a plan to deal with the problem, and increasing learning and knowledge
- Improving management practices

Given the writer's experience, it is his believe that Deming was brilliant and the Japanese used his PSoK to great effect. His value is growing in the Americas and if it was not so much for his less than easy style of writing this would have happened a lot sooner. His role of a manager after transformation should be studied very carefully (3.10.3). Deming (1994:116) '...the job of a leader is to accomplish transformation of his organisation'

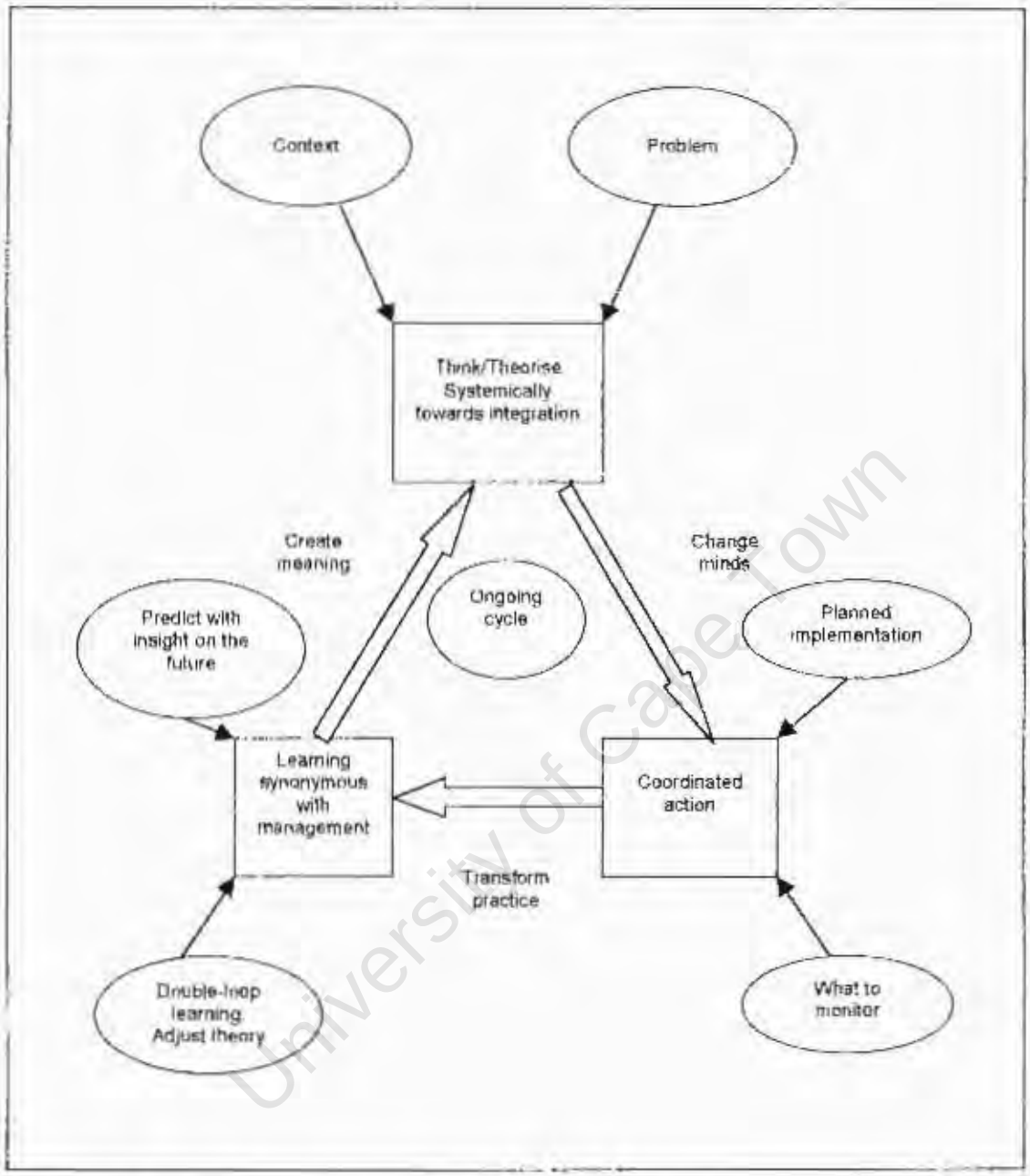
## 6.6 PERSONAL REFLECTIONS

There are so many personal reflection that I am left with. I will recount some of the highlights:

- Dealing with complexity and the benefit and techniques of bringing in multiple perspectives
- The struggle of formulating the problem clearly
- The value of genuine knowledge through the overlap of theory, practice and well formulated logic
- The lifelong value of systems thinking
- The necessity for using various means to manage variation, from the smallest SPC plot sheet to the S5 Policy function using requisite variety methods.
- Gaining the participation of all the key stakeholders
- The sense of being able to predict in this complex dynamic world we live in.

## 6.7 CONCLUSION

A final word is to think systemically and act scientifically and to end off with the quotation from Max DePree (1986) already quoted: "I would not give a fig for the simplicity side of complexity, but I would give my life for the simplicity on the other side of complexity."




MODEL 6.2: Reflection of Transformation Process

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| SUBJECT | HISTORICAL 1981 - 1995 | 1996 - 1999 TRANSITIONAL | 2000 - POTENTIAL FUTURE |
|---|---|---|---|
| OVALL DRIVING FORCE & IDEA | - Licensee for captive SA Market of HCV drive train.<br>- Combination of product concept and market type. | - Going it alone to use installed capacity.<br>- Production capacity/capability. | - Technology system supplier, with Technology partners. |
| PROFILE | - Product/Service concept.<br>- Substantial capital investment to exploit the protected environment to provide assembled driveline aggregates to local HCV OEM customers using licensed technology.<br>- Good manufacturing technology (knowledge/skills).<br>- CIM (Computer Integrated Manufacturing). | - Production capacity/capability concept.<br>- Utilise gear cutting technology.<br>- Three major sources of raw materials (castings, forgings and aluminium).<br>- Shift to components for both heavy transport and passenger O.E's using MIDP for local O.E's and additionally | - Partnerships with world wide O.E's towards being designer approved system suppliers.<br>- Customer Intimacy to support being a global systems supplier |
| DRIVERS | - Modern technology (15-17 years ago-early 1980's).<br>- Licensee to ZF, MAN, MB and Rockwell.<br>- Dependence on MB (SA) as major customer.<br>- Order takers in Marketing. | - Building strong supplier partnerships.<br>- Going it alone.<br>- Had to gather intelligence of global market - go out and show ourselves. | - Partnerships to maintain technology and marketing cutting edge. |
| PRODUCTS | - Diverse HCV Axles for heavy transport industry.<br>- HCV manual gearboxes for heavy transport industry.<br>- Trailer equipment (axles, landing legs, accessories).<br>- Fifth wheel.<br>- Spares (local O.E's). | - Ready to assemble automotive components to customer spec.<br>- Fifth wheels.<br>- Spares (local O.E's and agents and global). | - Product range needs to be truly focused.<br>- Systems supplier (jointly developed).<br>- Light weight products.<br>- Spares - Global low variety high volume. (All makes). |
| MARKETS | - South Africa only.<br>- (License restricted.) | - Only one license (assembly only) remains.<br>- South Africa.<br>- Europe (Germany, UK).<br>- Export orientation. Essential to future success.<br>- Middle and far East.<br>- Pacific rim. | - Support O.E's as system suppliers (locally).<br>- South Africa.<br>- Focus on export markets.<br>- Europe (Germany, UK, France and Italy).<br>- USA - need to build brands through technology/ product partnerships. |
| CUSTOMERS | - Local HCV - O.E's.<br>- Trailer builders.<br>- Local spares O.E's. | - Worldwide automotive O.E's.<br>- Spares locals O.E's and non O.E's. | - Firstier supplier to global O.E's.<br>- Opportunities for joint ventures with customers. |
| COMPETITORS | - None.<br>- Local O.E's parent CO's. | - Local HCV O.E's parent companies.<br>- Eaton.<br>- MAN/MB on axles.<br>- Direct importers. (Pirates/Spares) | - Eaton.<br>- Global O.E's.<br>- Other system's suppliers to global O.E's. |
| SUPPLIERS | - Overseas (limited) - forgings - castings.<br>- Some local foundries - castings.<br>- 50% low volume parts imported.<br>- Aluminium in ingots. | - Locally sourced forgings. (Much effort to support global market). (Alliances).<br>- Locally sourced castings.<br>- Seek to influence raw material suppliers.<br>- Aluminium in molten state and vertical integration. | - Vertical integration of supply chain.<br>- Forge and foundry. |
| AUTO INDUSTRY | - Domestic market focussed.<br>- Do all manufacture and assembly in house. | - Global O.E's out sourcing.<br>- Global spillage to use of capacity.<br>- Runouts of old models for larger European markets.<br>- Local O.E's desperately need MIDP export credits. | - Global O.E's looking to out source systems. |

| SUBJECT | HISTORICAL 1991 - 1998 | 1995 - 1999 TRANSITIONAL | 2000 - POTENTIAL FUTURE |
|---|---|---|---|
| TECHNOLOGY<br>PROCESSES | - Extensive machining capability<br>- Machined casting<br>- Machined forgings<br>- Licensor provided but with strict agreements | - Aluminium (lighter components/low mass).<br>- Need to stay in touch with technologies | - Growth in lighter alloy components<br>- Investment in faster and flexible machines.<br>- Hard (finished) machining. |
| MANUFACTURING<br>INGREDIENTS | - High variety low volume (Batch production)<br>- Quality inspection<br>- ZAMCS (MRPII)<br>- CAD/CAC (Intergraph) CIM<br>- Capacity/capability under licensor umbrella | - High volume low variety but greater flexibility<br>- Absolute quality at source (S.P.C)<br>- CIM systems need to support rapid product intro<br>- Modular cells for specific products in high volume<br>- Capacity/capability to be global supplier to auto industry in the main | - Design, manufacture and assemble of systems to global O.E's. |
| ENGINEERING | - Engineering changes re Gamma licensors<br>- Limited to support aggregate assemblies and back up warranty and service | - Take customer drawing/product and assess manufacturing capability - manage material, tooling and process capability.<br>- Product re-engineering capability.<br>- Simultaneous engineering must be optimised | - Designer, Manufacturer and Assembler of Systems to global OE's. |
| LOGISTICS | - Local suppliers - 40%<br>- Overseas suppliers - 60%<br>- Local customers - 100% | - Need to "warehouse close to customers"<br>- Local suppliers - 80%.<br>- Overseas customers - 50% - Need to reduce lead times and implement J.I.T | - Local suppliers - 80%.<br>- Overseas customers - 70% - Need to reduce lead times and implement J.I.T |
| QUALITY RATING | - ISO9002 | - QS9000.<br>- ISO9001<br>- VDA6 | - QS9000<br>- ISO9001<br>- VDA6. |
| ECONOMY | - Scrapping of exchange control.<br>- Reduction of import tariffs via MIDP/GATT. | - MIDP. (Export credits)<br>- ROE (Weakening Rand).<br>- Interest costs. | - Continued ROE (weakening Rand)<br>- Clustering incentives in value chain. |
| COST STRUCTURE | - Supported complete set of O/H services for aggregate, assemblies and service back up | - Need focused work in-house, outsource many services.<br>- Need to start capex on new machinery | - Need for substantial capex on new machinery |
| PEOPLE | - Low volume high variety no SPC required<br>- Marketing order takers<br>- Applications Engineers<br>- Recruited AA candidates failed. | - SPC essential.<br>- High volume needs user to continues improvement.<br>- Sales Engineers.<br>- Manufacturing/Industrial Engineers<br>- W.C. Manufacturing techniques applied<br>- E.E.O. mainly in-house development. | - Implications of automation.<br>- Global sourcing of skills.<br>- Greater contractor workforce. |

DEMINGS FOURTEEN POINTS

1. Create constancy of purpose toward improvement of product and service, with the aim to become competitive and to stay in business, and to provide jobs.
2. Adopt the new philosophy. We are in a new economic age. Western management must awaken to the challenge, must learn their responsibilities, and take on leadership for change.
3. Cease dependence on inspection to achieve quality. Eliminate the need for inspection on a mass basis by building quality into the product in the first place.
4. End the practice of awarding business on the basis of price tag. Instead, minimize total cost. Move toward a single supplier for any one item, on a long-term relationship of loyalty and trust.
5. Improve constantly and forever the system of production and service, to improve quality and productivity, and thus constantly decrease costs.
6. Institute training on the job.
7. Institute leadership. The aim of supervision should be to help people and machines and gadgets to do a better job. Supervision of management is in need of overhaul, as well as supervision of production workers.
8. Drive out fear, so that everyone may work effectively for the company.
9. Break down barriers between departments. People in research, design, sales, and production must work as a team, to foresee problems of production and in use that may be encountered with the product or service.
10. Eliminate slogans, exhortations, and targets for the workforce asking for zero defects and new levels of productivity. Such exhortations only create adversarial relationships, as the bulk of the causes of low quality and low productivity belong to the system and thus lie beyond the power of the workforce.
11. Eliminate work standards (quotas) on the factory floor. Substitute leadership. Eliminate management by objectives. Eliminate management by numbers, numerical goals. Substitute leadership.
12. Remove barriers that rob the hourly worker of his right to pride of workmanship. The responsibility of supervisors must be changed from sheer numbers to quality. Remove barriers that rob people in management and in engineering of their right to pride of workmanship. This means *inter alia* abolishment of the annual or merit rating and of management by objectives.
13. Institute a vigorous program of education and self-improvement.
14. Put everybody in the company to work to accomplish the transformation. The transformation is everybody's job."

## THE CHARACTERISTICS OF MENTAL MODELS

Rouse and Morris (1986) believe that mental models are caused and driven by three factors. The three factors used need to be read together as an integrated input as to the influence of the formation and management of mental models. These are given in figure below.

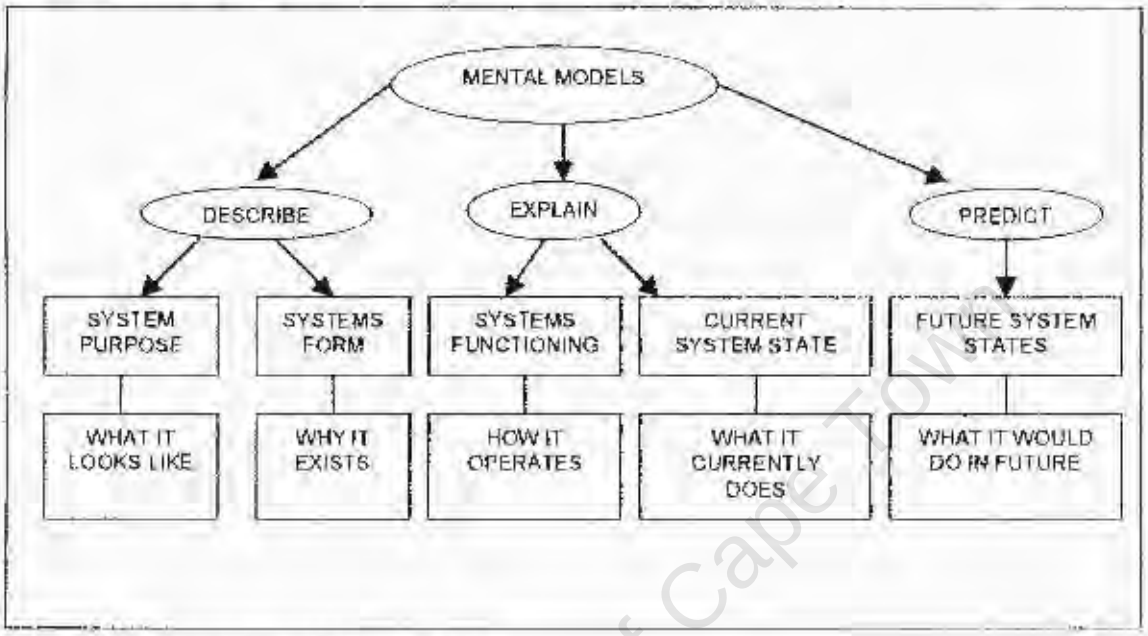



Figure: Characteristics of Mental Models

Rouse and Morris (1986:351) state further that: "Mental models are the mechanisms whereby humans are able to generate descriptions of systems purpose and systems form, explanations of systems functioning and observed systems stated and ability of predicting future system states."

The General Rules of Mental Models

Ballé (1994) argues that mental models tend to follow three general rules of consistency, stability and simplification. This is shown in the figure below
Mental models, as Ballé (1994: 23) explains, ". .reflect the similar beliefs we hold onto, that have been filtered and simplified to assist us in dealing with the complexities of the world we find ourselves in.

Over time mental models develop and undergo continual change, provoke new thought, prompt fresh changes and through this growth build new mental models.

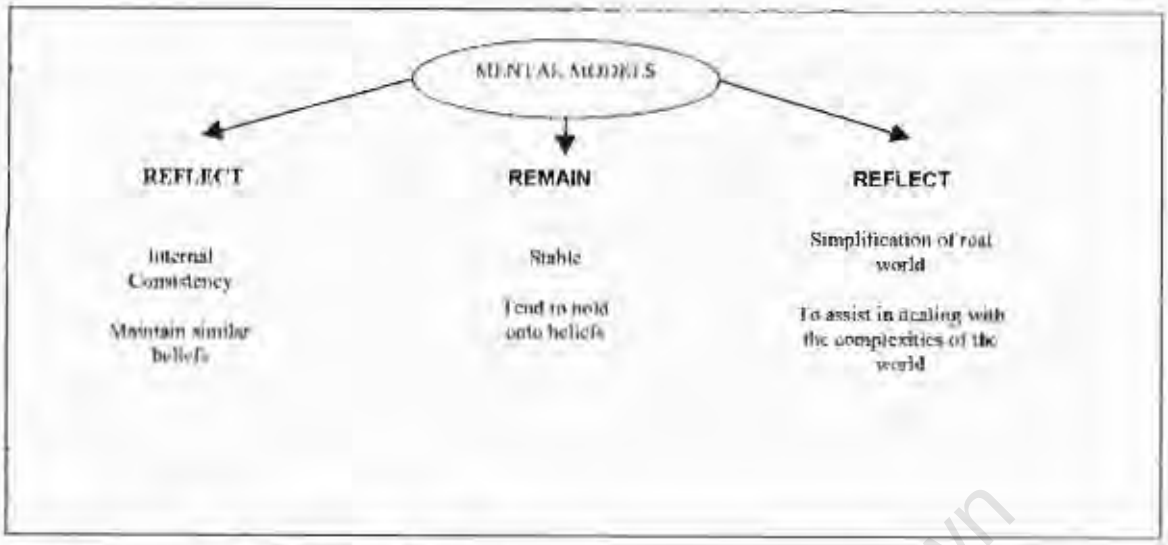



Figure : General Rules of Mental Models

If one assumes that one operates in this broader world with its many influences, complexities and variables in ongoing change, then the problems will be unable to be solved if looked at within established boundaries (mental models. This provokes new thought, with new rules, that leads to rapidly solving old problems. This process is ongoing and it is only in understanding how mental models function that one can begin to accept that they are in turn affected by and contribute to continuous change.

Ballé (1994) (In Figure below) describes how one's background, education, experience, the current context and finally the purpose or objective of what one wants to achieve are all factors that influence how mental models are constructed.

Mental models construct a representation of reality. If combined the factors of the building blocks of how mental models are formed together with accepting that mental models are built through internal consistency and simplifying the complex world will be realised.

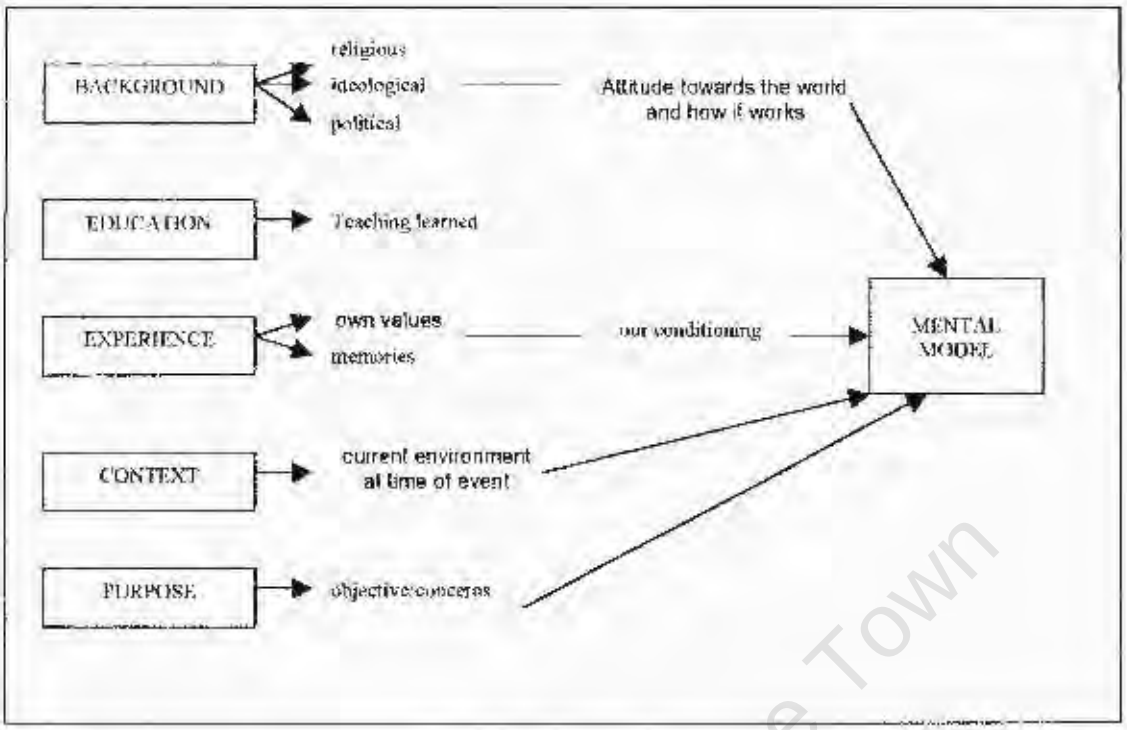



Figure: Building Blocks of Mental Models

# ARTICULATION OF THE BUSINESS IDEA

The nine-step process needs to be a facilitated one. This is to ensure that the management team adheres to the concepts and to produce and lead the team.

- DECIDING ON THE COMPETITIVE ADVANTAGE

  This commences with the determining the basis for competitive advantage and is followed by determining what the organisation has to do well to deliver this promise.

- ADDRESSING THE DEVILS ADVOCATE QUESTION

  This is merely as a verification of the first step and it determines the unique factors that need to be exploited and why and how others are unable to emulate these factors.

- DEVELOP A CAUSE AND EFFECT PICTURE

  Using the devils advocate question, the facilitator invites the team to specify the company characteristics causing the competitive advantage. These are recorded and arrows are drawn from the sources to the competitor advantage record. Furthermore the causes of the source's existence are determined as well as the method of surfacing them

- COMPLETION OF THE DIAGRAM

  This is merely finalising the loose ends of the diagram and this should continue until explanatory arrows support all elements in the diagram

- IDENTIFYING THE DISTINCTIVE COMPETENCIES

  It is essential to remember that these need to be unique to the company distinguishing clearly itself from the competition, and these also need to be difficult to emulate.

- CLEANING-UP

  This is to complete the diagram by eliminating the crossovers and to validate the diagram with the SWOT analysis.

- REVIEWING THE BUSINESS IDEA

  The reviewing entails determining whether all the strengths have been reflected, and whether the business idea can overcome the structural weaknesses that have been identified. It also assesses the longevity of the business idea into the future.

- DRAWING OUT THE ESSENTIALS

  Here the business idea can be reduced to the key leverage issues so that focus can be achieved.

- STRATEGIC REPERCUSSIONS

  Here the business idea is confronted with the opportunities and threats in the SWOT analysis. The business idea is reflected against different scenarios. When a conclusion is reached it is useful to express the results in qualitative strategic objectives. This is to ensure that the business idea has a good basis for business development, and if so, the objectives need to be formulated.

## TOWARDS THE INSTITUTIONALISING OF SCENARIO THINKING/PLANNING/LEARNING

If some well-developed scenarios have been widely workshopped into the organisation, they tend to become part of the corporate language spoken. A short, concise, descriptive and memorable sentence is all that is required for a title of a scenario. This then starts influencing the strategic thinking. Projects can be compared with optional scenarios and justifications made against each scenario.

Mental models start to be aligned. The embellishment of a mental model that is still in its infancy takes place. Eventually using the conversational process this integrates into the formal process of Strategic Planning.

Good scenarios provide:

- new interpretations as to what is going on
- openings for new perspectives
- the development of greater common understandings
- the reduction of anxiety of the future

The full usefulness of this will also depend on how well they are institutionalised. This is dependent on the culture, the structure and the previous experience of strategic planning.

## A METHOD OF INSTITUTIONALISING SCENARIO PLANNING/THINKING/LEARNING

### INTRODUCTION

The theoretical steps to be followed in Scenario Planning are shown over the page in Figure 6.5. The institutionalising or the process side of scenario planning is given below.

### Scenario Presentations

The process for this is as follows. Scenario teams need to ensure that:

- they make the scenarios easy to remember by constructing the wording simply and clearly
- developing consistent presentations via audio/visual media
- writing scenario books
- organising meetings and workshops
- require that the scenarios are used for project proposal and justifications for decisions

Scenarios are distinguished by reference to the two most impactful dimensions used. The following is done

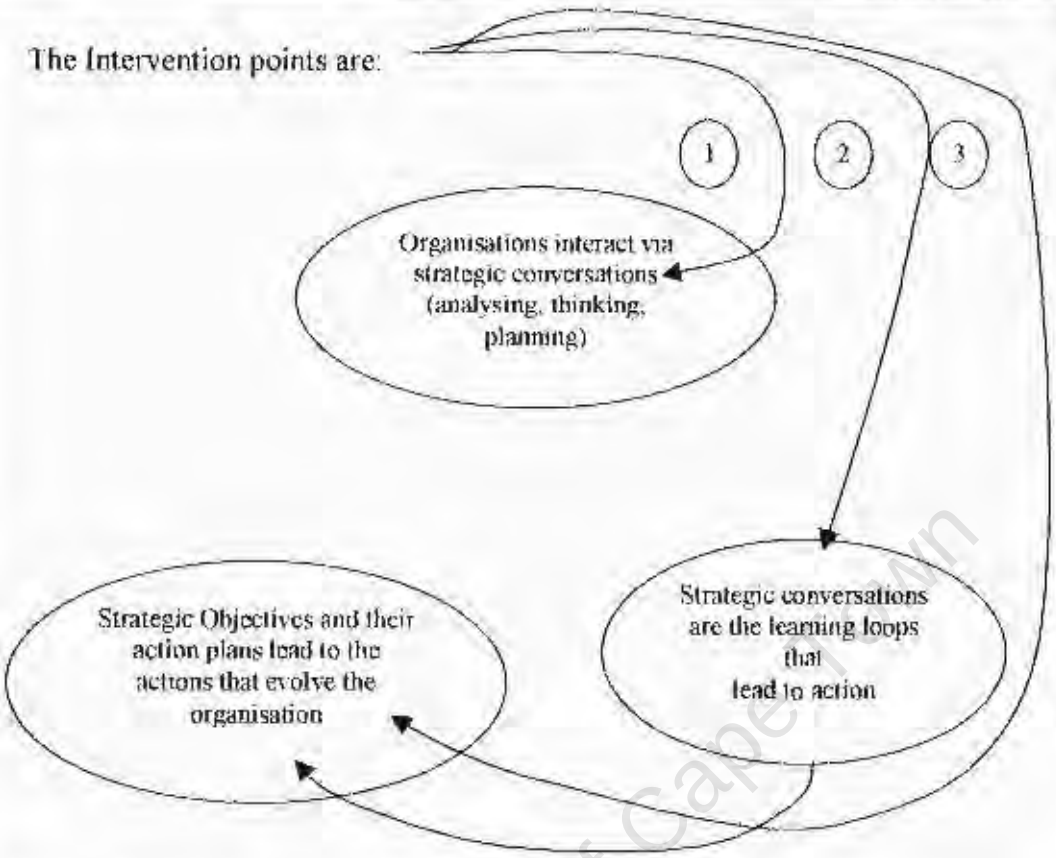
- establishing the central theme gives an overview of the scenarios
- logical cause and effect diagrams are constructed
- highlighting the driving forces
- selecting striking names
- designing images to support the scenario/s

GUIDING THE STRATEGIC CONVERSATION

The formal planning steps of strategic planning, is only a small part of strategic conversation. The discussions that are made in the passages while discussing strategic objectives, the informal moulding of mental models while having a drink after work. These are far more powerful and influential. The informal, unscheduled, ongoing discussions have a greater influence on 'learning' and influencing the mental models of not only the management team but also the entire organisation. This is embedded in the culture of the organisation. However the benefits can only be achieved if the necessary level of thinking, planning and learning is harnessed. In fact if it is harnessed it can become a competitive advantage and a distinctive competence of the organisation."Organisations are primarily systems of cognitive logic." Weick, (1969). These are the complex informal processes that happen daily between all employees in the organisation

DEVELOPING LEARNING CAPABILITY

Where there is a need to increase integration then there is a lack of a shared sense of direction, or a lack of coordination, a lack of openness, or of political orientation (doing own thing) then the first thing that has to be done is to increase the quantity of strategic conversations. This can be done by creating conversational events, from small get togethers to large entire management/staff gatherings where well-prepared information on the subject is covered. Additionally one can combine top-down sharing with bottom-up feedback sessions.
Should a need exist to increasing differentiation where there is too much of the same thinking and it needs to have greater divergent views to unlock its current paradigms, then greater exploration and experimentation is necessary. In this instance 'maverick' views should be encouraged. New crazy ideas fostered.






The Key Points Are:

- Time has to be spent on analysing thinking and planning the strategic future.
- Managing strategic communications has huge influence over the process.
- Managing the learning loops (double loop more so) has a huge impact.
- Evolving the organisation to grow beyond survival using the business idea of developing strategic vision and developing distinctive competencies is essential.
- Maximising the value overlap of the customer's value requirements and the seller's distinctive competencies is essential.

Figure 5.4: The Art of Strategic Conversation

## SCENARIO WORKSHOPS

Using the scenario presentations as a base, scenario workshops can be supplemented to ensure audience participation. The process that is followed:

- presentation of the basic facts
- open discussions
- the workshop breaks up into teams and they then build the logic of their own scenarios
- team feedback via 'storyboards' where events are described and how they interact on a cause and effect interrelationship diagram are presented. In this way the driving forces can be established. A typical agenda could be:
  - business environment
  - competitive advantage
  - business idea
  - distinctive competencies
  - strategic options assessment
  - strategic development
  - activity planning
  - competitive positioning

## DEVELOPING LEARNING CAPABILITY

- Increasing Integration
  If there is a lack of a shared sense of direction, or a lack of coordination, a lack of openness, or of political orientation (doing own thing) then the first thing that has to be done is to increase the quantity of strategic conversations by creating conversational events (from small get together to large entire management/staff gatherings) well-prepared information on the subject to be covered.
- Combine top-down sharing with bottom-up feedback sessions.
- Increasing differentiation
  If there is too much of the same thinking and it needs to have greater divergent views to unlock its current paradigms then greater exploration and experimentation is necessary. In this instance 'maverick' views should be encouraged. New crazy ideas fostered.

# HOW CAN MANAGEMENT USE THE VSM TO ASSIST THEM IN STRIVING FOR EFFECTIVE MANAGEMENT IN A DYNAMIC ENVIRONMENT

Jackson and Flood developed VSD- Viable Systems Diagnosis. With the inputs already covered and the detail of VSD given below it is clear that the VSM is definitely to be considered as a Management tool.

VSD (Viable Systems Diagnosis) can be used to diagnose an organization and make a complicated process a lot easier. This is broken up into two phases — systems identification and systems diagnosis.

## SYSTEMS IDENTIFICATION

The steps in this process are as follows:

- Identify the systems objectives to be achieved.
- Determine the relevant system to achieve the objectives of the system to be analysed re the 'system in focus'.
- Determine the main focus of the business i.e. System 1.
- Determine System 5 and then System 4, 3 and 2.

## SYSTEMS DIAGNOSIS

- Study the System 1 of the system in focus:
- for each part of System 1 detail its environment, operations and management;
- study what constraints are imposed upon each part of System 1 by higher management;
- ask how accountability is exercised for each part, and what indicators of performance are taken;
- model System 1 according to the VSM diagram.
- Study System 2 of the system in focus:
- list possible sources of oscillation or conflict between the various parts of System 1 and their environments and identify the elements of the system (the various System 2 elements) that have a harmonising or dampening effect;
- Ask how System 2 is perceived in the organisation (as threatening or as facilitating).
- Study the System 3 of the system in focus:

- list the System 3 components of the system in focus;



- ask how System 3 exercises authority;
- ask how resource bargaining with the parts of System 1 is carried out;
- determine who is responsible for the performance of the parts of System 1;
- clarify what 'audit' enquires into aspects of System 1, System 3 conducts;
- understand the relationship between System 3 and the System 1 elements (is it perceived to be autocratic or democratic?) and find out how much freedom System 1 elements possess.
- Study the System 4 of the system in focus:
- list all the System 4 activities of the system in focus;
- ask how far ahead these activities consider;
- question whether these activities guarantee adaptation to the future;
- determine if System 4 is monitoring what is happening to the environment and assessing trends;
- assess in what ways, if any, System 4 is open to novelty;
- find out whether System 4 provides a management centre/operations room, bringing together external and internal information and providing an 'environment for decision';
- Question if System 4 has facilities for alterng System 5 to urgent developments.
- Study the System 5 of the system in focus:
- ask who is on 'the executive committee' and how it acts;
- assess whether System 5 affects the 'perception' of System 4;
- Determine how the 'ethos' set by System 5 affects the System 3—System 4 homeostatic (is System 3 or System 4 taken more seriously?);
- Investigate whether System 5 shares an identity with System 1 or claims to be something different.
- Check that all information channels and control loops are properly designed.

Diagnosis often leads to the discovery of some improvements that can be made. Some of the common faults found in organisations having been through the VSD process are presented below.

FREQUENT FAULTS FOUND IN ORGANIZATIONS USING VSM

- Mistakes are made in articulating different levels of recursion.
- The importance of certain parts of System 1 is not recognised, so they are not treated as viable systems and lack a localised management to tend to their affairs.
- The existence of additional irrelevant features of structure, which hamper viability, is found.

- System 2, 3, 4 or 5 of an organisation seeks viability in their own right. In a viable system, Systems 2, 3, 4 and 5 should serve the whole system by promoting the implementation function and should not be allowed to function at the expense of the system as a whole—they should not become bureaucratic.
- System 2 is not fully established because local managers of System 1 resent interference from this relatively junior control echelon.
- System 4 is weak because it is regarded as a 'staff' function and its recommendations are ignored—according to Beer, it should be part of 'line' management.
- System 5 collapses into System 3 because System 4 is weak.
- System 3 managers are found interfering in the management process at System 1 level.
- System 5 is not creating an identity and is not representing the essential qualities of the whole system to the wider system of which it is a part.
- The communication channels in the organisation and between the organisation and the environment do not correspond to the information flows said to be necessary in any viable system.
- Transmission of the indices of performance is not rapid enough.

We have now considered the model, the model in use, and some common faults that may be uncovered through diagnosis.

INDICES TO ASSESS PROGRESS

Beer (1981) developed an important set of indices to check the long as well as the short-term achievement of an organisation. He believed that there are five concepts that should be monitored and that working together they can influence the performance of an organisation. Each are defined and then how they impact on each other.

Potentiality is that which is achievable by removing constraints and developing resources.
Capability is the possible achievement using existing resources within existing constraints.
Actuality is the current achievement within existing resources and constraints.
Productivity = actuality/capability;
Latency = capability/potentiality;
Performance = latency x productivity

Productivity and latency are ratios showing, respectively, short term and long term levels of achievement. By definition, performance is the product of latency and productivity.
These ideas are clearly relevant to viable systems thinking.

Each of the five functions can be seen as a way of filtering variety—the complexity that without proper management will overwhelm any organisation.

Each function deals with much of the variety coming in but passes information on if it does not have the ability within itself to deal with issues raised. This prevents data overload occurring in the various management functions and allows for local autonomy.The five functions together deal comprehensively with all management information. The great variety, which the organisation.

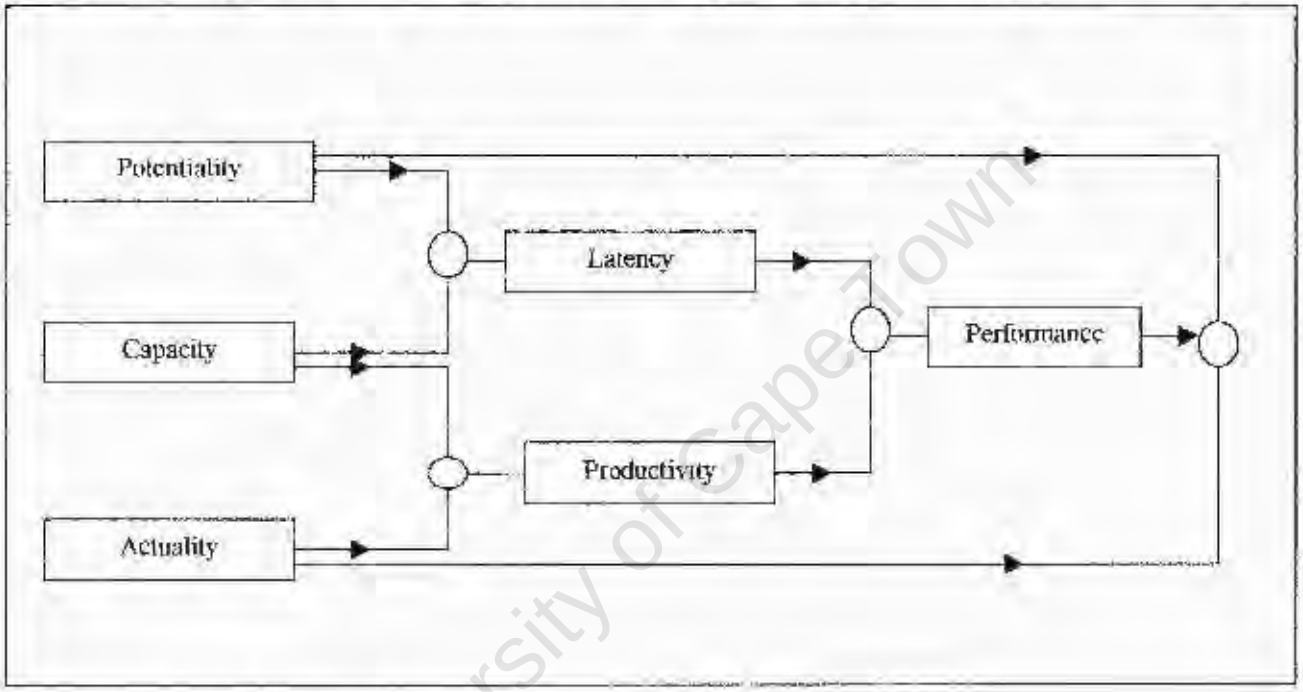



**Figure: Indices to Assess Progress**

**CONCLUSION**

**The viable systems model gives us a mental model for complex organisational problem solving in this day and age of high complexity and dynamic change. It offers an approach to design, control and structure organisations effectively to support the value-added process.**

# THE SCIENTIFIC METHOD

## Introduction

Based on the learning process already portrayed in Chapter 3 the scientific method was developed by Reg Revans and applied to the management sciences. Revans (1957) based it on five major steps:

i. observation of the external world
ii. the formulation of theories based on these observations
iii. the design and conduct of experiments to test the theories
iv. comparison of the results with the predicted results
v. the rejection, modification or confirmation of the theory

These five steps are shown graphically in an adjusted way in the model shown below.

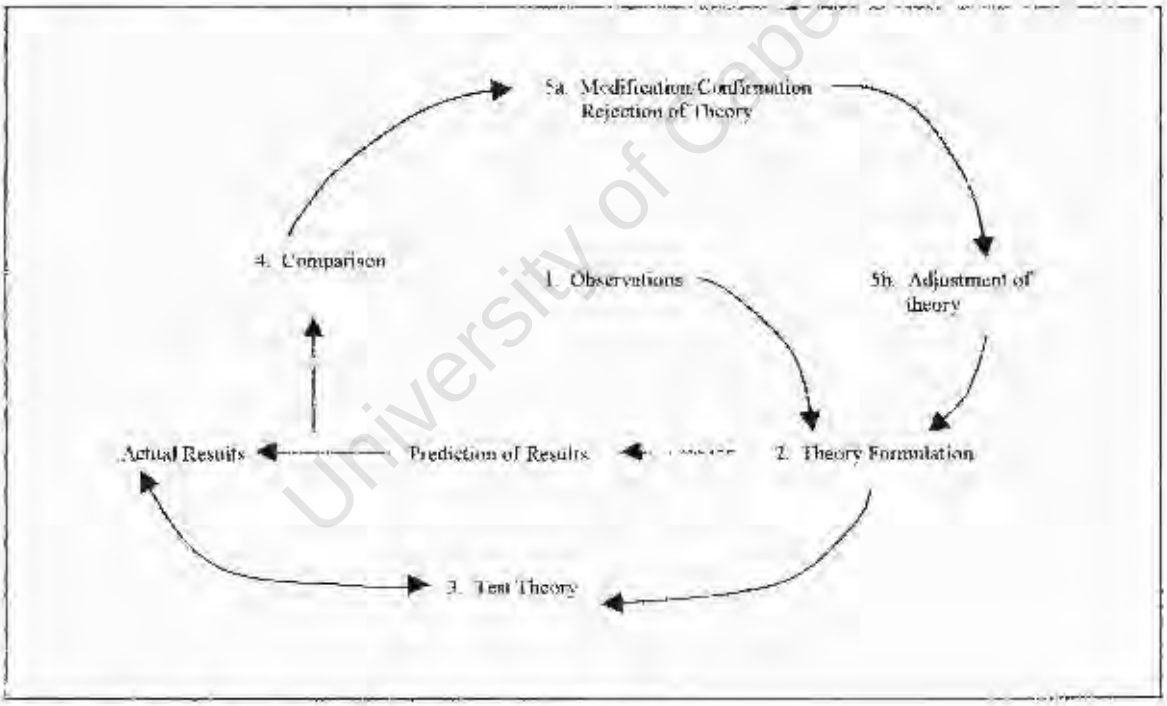



Figure : The Use of the Scientific Method in Management

These steps become the strategic management steps and reformulated could be as follows:

| | | | | |
|---|---|---|---|---|
| Observations | ↔ | Surveys | ↔ | What needs to be done. |
| Theory formulation | ↔ | Policy formulation | ↔ | What to do. |
| Test theory | ↔ | Operations management | ↔ | Do it in the best way. |
| Comparison | ↔ | Audit and inspection | ↔ | Test how will it is done. |
| Rejection/modification/confirmation | ↔ | Control | ↔ | Review/modify. |

Table : Strategic Management Steps

Revans remarks that it compliments the two ancient arguments of the difference between theory and practice. Many philosophies now concur that there is no difference, including John Dewey in "there is no 'theoretical knowledge', all knowledge as...merely an ability to make things".

What Is the Value of the Scientific Method to Management?

What has been stated is rather commonsensical. It is fact that complex situations if approached in a thoughtful manner, in this case scientific method approach, and applied with persistence and rigour can simplify the situations at hand significantly enough so they can be dealt with effectively.

If management continue using existing knowledge to decide upon actions and set standards by which the results of action can be judged then they will fail.

Conclusion

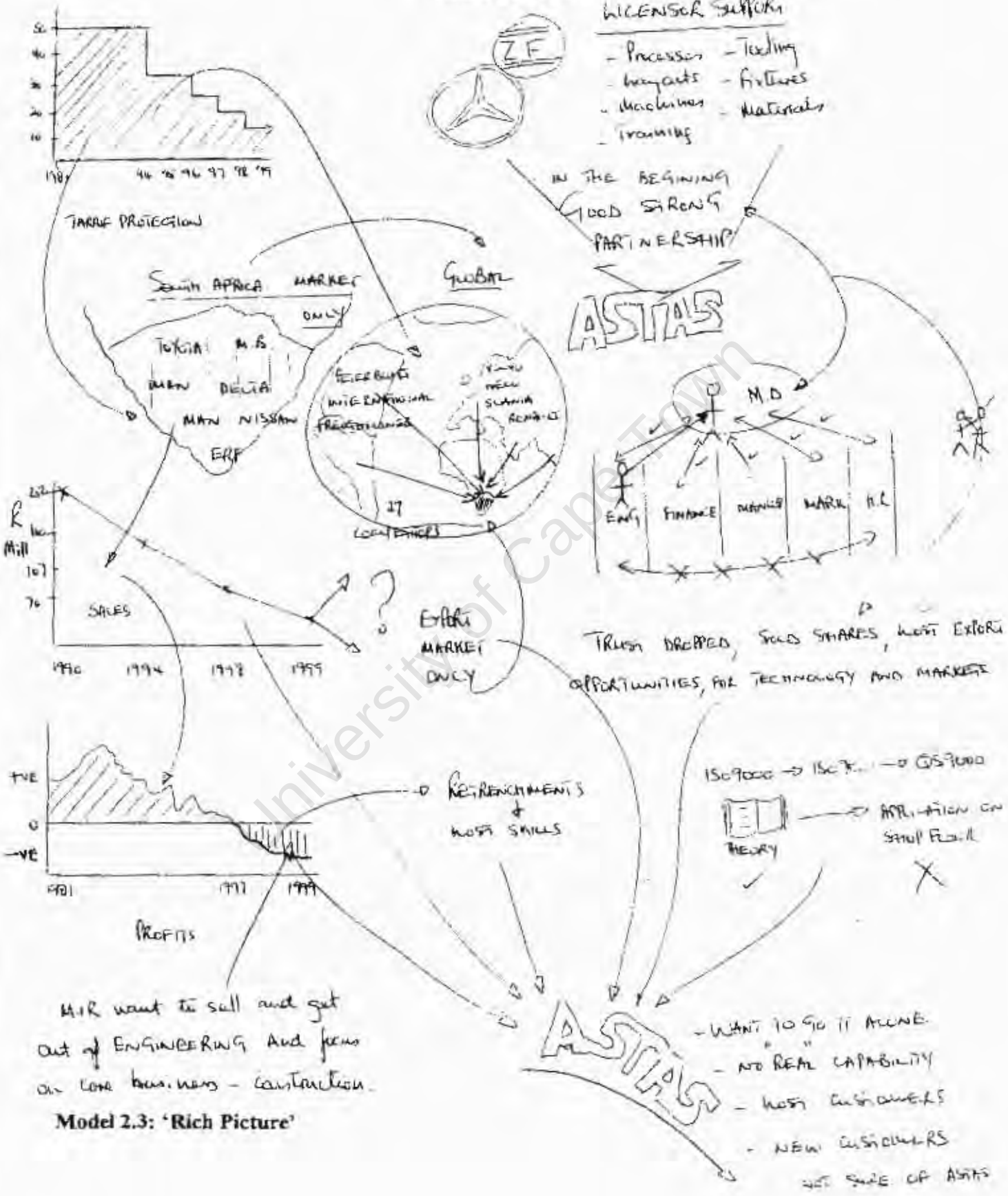
The scientific method can be applied to management or almost anything. So what is it? It is a model based out of thinking. These thoughts are a model for action. Revans (1969)puts it: "It is the human capacity to think in terms of models" and in this case apply them to management that is important.

This approach of observing one's external world and forming a theory on how it works while designing and conducting a practical assessment and subsequently comparing this leads to a confirmation, modification or rejection of the theory and thereby contributes to learning. It further adds value to learning to predict the future.

As can be seen used in the organisational world this process is cyclical and recursive. If double-loop learning is applied and predicted and actual results are compared and reflected against the theory/policy formulation then the mental model can be modified or adjusted. It can be used at different levels in the organisation, i.e. to evaluate strategies or review new standard practices. What it requires is a high standard of record keeping and a wide understanding of statistical methods. The scientific method has to be implemented with the utmost rigour.

Revans (1957: 110) puts it like this: "The scientific method applied to management is merely a model built out of thought—just as thoughts are models built out of consciousness, suggesting how we should act: they carry us forward into the future on the experience of the past...It is the human capacity to think in terms of models that justifies making a model of the scientific method."

# 'RICH PICTURE'




**Model 2.3: 'Rich Picture'**

ASTAS SCENARIOS

SCENARIO 1 BLIND

This scenario falls into the quadrant of a limited competitor strategy knowledge with the South African economic stability (ROE) in decline.

The issues considered in Scenario One were:

- The changing technology requirement.
- The future strategy of the Original Equipment Manufacturers (OEMs).
- The instability of local government. This is in two forms:
    - i) no local incentives available for future investment
    - ii) increased crime is also contributing to the government instability
- Limited demand knowledge of the global market.
- Limited market intelligence in terms of the types of components that are marketable.

This scenario deals with a situation where little research has been completed in terms of market requirements.

To add to the difficulty of competing in a declining market the demands for improved technology with a focus on increased productivity and quality would have to be addressed. The past performance of local government does not give confidence for support in financial terms nor in general economic growth.

SCENARIO 2 NON-COST COMPETITIVE

The second quadrant scenario manifests itself is one where the South African economic stability is improving while the knowledge of the competitor strategy is limited.

- Slow local project capability
    - The prediction is that the project capability will be unchanged for the next couple of years (due to investment being required).

- Bad local supply capability

- The current local supply capability will not improve drastically in the near future.

- Bad local logistic capability
  - Logistic capability includes the state of the declining transport business in South Africa. Transportation to the harbours and over the water due to the distance is costly and time consuming and will impact on export profits.

- Low internal capability
  - Internal capability is stagnant at present. A revised focus on training will have an improvement in the internal capability. But opposing this is the recent retrenchment programme the company went through. This action downscaled experience and the knowledge of the workforce.

- Declining South African economic stability
  - The value of local currency has a negative influence on imported product, but stimulates export opportunities. Interest rates and offshore investment opportunities also impact negatively on the economic stability.

If we cannot produce a product that is cost competitive in the local and export segments, the viability of the company is threatened. Under the current situation the export possibilities must be high priority with a constant focus on cost reduction on initiated product to secure current and future orders.

SCENARIO 3: IN THE RACE

This scenario falls in a quadrant where we know a lot about the strategy of the different competitors and the South African economic stability is declining.

- Quick local project capability
  - Newly formed partnerships with offshore companies result in improved project capability. Centralised R&D facilities supply information and know-how to eliminate self development time and cut introduction times to launch new products. Investment in necessary equipment speeds up the process further.

- Good local supply capability

- Different suppliers also form partnerships with international companies to ensure product and price availability. In-house system improvement, ensure timeous delivery at the right cost and quality.

- Static/technology requirements
  - The business contracts secured will remain at the current technology requirements. New technology will require minor changes or modifications to existing equipment.

- High internal capability
  - Extensive training programmes can ensure internal capability. New key personnel appointments will ensure an improvement in capability and growth. Equipment is reliable and well maintained to reduce down-time. Scheduling and planning is well orchestrated to ensure maximum utilisation.

- Stable local government

Government ensures an environment for growth and stability, promoting offshore investment and interest. The forthcoming elections do not result in unrest and instability and as a result international investment is attractive.

SCENARIO 4: IDEAL

This scenario falls in a quadrant where we have lots of competitor strategy knowledge in an improving South Africa.

- Knowing the future strategy of the OEMs will influence the high cost investment decisions necessary to keep up with improved technology. If the strategy of the OEMs is to import built-up units, options can be taken to use after market opportunities for export.
- A high internal capability will assist in reacting quickly to changing market conditions and reducing 'time to market' lead times. This should also add to flexibility in terms of technology requirements.
-
-

- When acquired knowledge of volume requirements into the future optimum production planning can be implemented with better amortisation of machinery and tool investment.
- Market intelligence from the competition will enable the client to develop a sound strategy for either supplying niche or volume markets depending on competitive product and pricing strategies.
- Knowledge of the strategic intent of the clients' competitors will also assist in formulating the client's own strategy. This knowledge will assist in keeping ahead in the race for competitive advantage.

This scenario would be ideal to be in. A high amount of market intelligence coupled with a high internal capability in an improved economic climate would allow for continued growth. This growth could come from both an increased export drive and also satisfying an improved local market. The internal capability would be maintained with financial rewards coming from an increased return on investment.

# ASTAS STRATEGIC AND OPERATIONAL CAPABILITY AND SYSTEMIC LEADERSHIP RECOMMENDATIONS

## STRATEGIC CAPABILITY

The following recommendations are made:

1. Use scenario planning to continue to maximise the value overlap between ASTAS and its current and new customer base and continuously assess the strategic options available.
2. Use systemic thinking to understand and simplify the contextual environment and relevant systems so that a few key leverage points can be acted upon.
3. Institute a marketing function and ensure that a marketing intelligence process like that of S4 in VSM is in place.
4. Create a culture of learning for both the individual employee and the organisation as a whole.
5. Utilise the Theory of Constraints (T.O.C.) more broadly due to awareness of this process.

## OPERATIONAL CAPABILITY

To achieve operational capability the following recommendations are made:

1. Ensure the customers' needs are fully understood through regular 'customer reviews'.
2. Conduct full capability studies of all resources (machines, fixtures and tools, raw material, processes and process plans, quality control measuring methods and gauging and people) to ensure the manufacturing system is capable of meeting the customer needs.
3. Use the systems thinking to focus on the manufacturing and processes bottlenecks so as to eliminate all key wastes and maximise the value-added process.
4. Ensure the scientific method approach as well as the systemic thinking process is used to measure all key internal measurement points and ensure these are under statistical control (quality plans, FMEA's, SPC, internal audits).
5. Reduce the variability of the systems inputs and outputs and measure scientifically (supplier quality and reliability, on-time delivery in and out).

6. Ensure that variation is fully understood in order to remove special cause, drive continuous improvement and eliminate tampering.
7. Train all employees on capability studies, statistical process control, Best Operating practices and Continuous Improvement initiatives.

SYSTEMIC LEADERSHIP

To achieve Systemic Leadership the following recommendations are made:

1. Develop systemic leadership using the conceptual model that starts with systemic thinking and results in breaking down barriers and building business partnerships internally and externally (the use of interrelationship digraphs and conceptual models are particularly good).
2. Build partnerships at the strategic level to improve the chances of market and technology improvements.
3. Build partnerships at operational level via the multidisciplinary project teams.
4. Continued discussions should take place to ensure that appropriate and convergent mental models are developed and where necessary the use of advocacy and inquiry so that one person's so-called 'authoritative' view does not hold others to ransom.

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