



UNIVERSITEIT VAN PRETORIA  
UNIVERSITY OF PRETORIA  
YUNIBESITHI YA PRETORIA

**THE DEVELOPMENT OF A COMPREHENSIVE, PRACTICAL AND  
INTEGRATED MANAGEMENT METHOD WITH SPECIFIC  
REFERENCE TO THE SOUTH AFRICAN MINING INDUSTRY**

**By  
JASPER DANIËL STONE**

**SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS  
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## THESIS SUMMARY

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by

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This research focused on the past to the present theoretical development of the management discipline and the practical application of it in the South African mining industry. The perceived deficiencies of the theoretical and practical management methods were identified and discussed. The role of the mining industry as one of the major contributors to employment, wealth creation, national gross product and national development was discussed. Existing and future challenges were highlighted. A motivation why the existing available theoretical management practices being utilised were inadequate to enable management to manage comprehensively was identified.

The management practices utilised or still being utilised in the South African mining industry were investigated and evaluated. The Mine Manager's Certificate of Competency, as a legally compulsory suitable qualification for a manager to be appointed as a competent person to manage a mine, part of it or works, was also investigated and evaluated.

The ideal management method should, at all times, provide in all the present and future theoretical and practical management needs of the total labour force on all the levels of the organisation. It should enable management to efficiently cope with the demands of rapid change and the efficient management of the future. It should ensure that all activities necessary for the efficient functioning of the organisation are totally integrated and coordinated. This management method should facilitate the optimisation of the collective skills, loyalty and dedication of all the employees on all the levels of the organisation. It should primarily optimise the desired planned results. Such a management method could not be ascertained from the literature and practice.



It was concluded that the South African mining industry is in dire need of a comprehensive, practical and integrated management method that would, at all times, provide in all the present and future theoretical and practical management needs of the total labour force on all the levels of the organisation. A sustainable, comprehensive, practical and integrated management theory and an implementation procedure, suitable to apply the management theory equally efficiently on all the levels of the organisation, was developed, discussed and proposed in this thesis.



## **SAMEVATTING VAN PROEFSKRIFVERSLAG**

# **DIE ONTWIKKELING VAN 'N OMVATTENDE, PRAKTIESE EN GEÏNTEGREERDE BESTUURSMETODE MET SPESIFIEKE VERWYSING NA DIE SUID AFRIKAANSE MYNBOUBEDRYF**

deur

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Hierdie navorsing het op die teoretiese ontwikkeling van die bestuurskunde in die verlede en huidige in die Suid Afrikaanse mynboubedryf gefokus. Die waargenome leemtes van die huidige teoretiese en praktiese bestuursmetodes was geïdentifiseer en bespreek. Die rol van die mynboubedryf as een van die belangrikste bydraers tot werk - en welvaartskepping en die nasionale brutoproduk-en ontwikkeling in Suid Afrika was bespreek. Huidige en toekomstige uitdagings in die mynboubedryf was beklemtoon. 'n Motivering hoekom die huidige beskikbare teoretiese bestuurspraktyke huidige in gebruik as onvoldoende beskou was om die bestuur in staat te stel om op 'n omvattende, en geïntegreerde wyse te bestuur was gedefinieer.

Bestuurspraktyke wat in die verlede gebruik was en die wat tans nog gebruik word in die Suid Afrikaanse mynboubedryf was ondersoek en geëvalueer. Omdat die huidige mynbestuurdersertifikaat van bevoegdheid nog 'n geldige wetlike vereiste is om 'n bestuurder te mag aan stel in beheer van 'n myn, gedeeltes daarvan of verbandhoudende werke was dit ook ondersoek en geëvalueer. Die leemtes van die huidige bestuurspraktyke sowel as die van die mynbestuurdersertifikaat van bevoegdheid was geïdentifiseer en bespreek.

Die ideale bestuursmetode moet aan al die huidige en toekomstige teoretiese en praktiese bestuursbehoefte van die totale arbeidsmag op all vlakke van die onderneming te alle tye voldoen. Dit moet die bestuur in staat stel om die eise van snelle verandering en die optimisering van die kollektiewe vaardighede, lojaliteit en toewyding van alle werknemers op alle vlakke van die onderneming doeltreffend te bestuur. Dit moet primêr die verlangde resultate lewer en optimiseer. Dit is noodsaaklik



dat alle aktiwiteite, benodig vir die doeltreffende werking van die onderneming, ten volle geïntegreer en gekoördineer word. Die bestaan van 'n sodanige bestuursmetode kon nie vanuit die bestaande bestuursliteratuur en pratyke geïdentifiseer word nie.

Daar word tot die slotsom geraak dat die bestuur in die Suid Afrikaase mynboubedryf 'n wesentlike behoefte het aan 'n omvattende, praktiese en geïntegreerde bestuursmetode wat te alle tye sal voldoen in al die huidige en toekomstige teoretiese en praktiese bestuursbehoefes van die totale werksmag op alle vlakke van die onderneming. Die teorie en prosedure vir die implementering van 'n volhoubare omvattende, praktiese en geïntegreerde bestuursmetode, geskik vir alle vlakke in die onderneming, was in hierdie tesis ontwikkel, bespreek en voorgestel.

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## **GENDER REFERENCE**

In this thesis, unless the text clearly indicates a contrary intention:

- the singular shall include the plural and vice versa,
- a natural person shall include an artificial person and vice versa, and
- any one gender shall include the other genders.



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## LIST OF DEFINITIONS

In this thesis the meaning of the following definitions would be applicable:

1. **Accountability:** the manager's expectation that the employee will accept credit or blame for his work (Hellriegel et al, 2005:302).
2. **Anthropology:** the study of humankind in all its aspects, especially human culture or human development.
3. **Approach:** a management approach is a general overall method of management, which aims to enable employees to manage comprehensively.
4. **Applicable:** relevant to a person, group of people or situation.
5. **Attribute:** a quality, property or characteristic of somebody or something.
6. **Authority:** the right to make a decision (Hellriegel et al, 2005:302).
7. **Business:** a company or other organisation that buys and sells goods, produce goods or provides services.
8. **Centralisation:** the concentration of authority at the top of an organisation or department (Hellriegel et al, 2005:304).
9. **Competency:** an ability to do something, especially measured against a standard. A management competency gap is the managerial proficiency difference of an employee between the general proposed management standard and the assessment conducted by an experienced management consultant or manager.
10. **Competitive:** inclined toward wanting to achieve more than others.
11. **Complexity:** the condition of being made up of many interrelated parts.
12. **Comprehensive:** inclusive or covering many things or a wide area. A comprehensive, practical and integrated management method is a management method that enables all employees, on all the levels, of any organisation to comprehensively manage for the achievement of the results required from them in all required aspects at all times.

13. Concept: way of doing or perceiving something, a method, plan or type of product or design.
14. Conceptualise: to arrive at a concept or generalisation as a result of things seen, experienced or believed.
15. Contextualise: to place a word, phrase or idea within a suitable context.
16. Coordinate: to organise a complex enterprise in which numerous people are involved and bring their contributions together to form a coherent whole so that they can act together effectively
17. Decentralization: the delegation of authority to lower level employees or departments (Hellriegel et al, 2005:304).
18. Deficiency: the amount by which performance falls short of a predetermined standard or set of standards.
19. Delegation: the process of giving authority to a person (or group or team) to make decisions in order to deliver the delegated responsibilities (Hellriegel et al, 2005:302).
20. Demarcate: to state in a clear way where something begins and ends.
21. Differentiation: an organisation composed of units that work on specialised tasks using different work methods and requiring employees with unique competencies (Hellriegel et al, 2005:300).
22. Discipline: a subject or field of activity.
23. Division of labour: the work of the organisation is divided into smaller tasks (Hellriegel et al, 2005:300).
24. Effective: causing the desired or intended result or results.
25. Effectiveness: the degree to which the organisation realises a stated objective (daft, 1995:13).
26. Efficient: capable of achieving the desired result with the minimum use of resources, time and effort.
27. Efficiency: the degree to which something is done well or without wasted energy.
28. Enterprise: organised business activities aimed specifically at growth and profit.

29. Environment: all the external and internal factors influencing the life and activities of people, plants and animals.
30. Expert: somebody with a great deal of knowledge about, or skill, training or experience in a particular field or activity.
31. Expertise: the skill, knowledge or opinion possessed by an expert
32. Factor: something that contributes or has an influence on the outcome of something.
33. Globalise: to become international or to start operating at the international level.
34. Hierarchy: the pyramid showing relationships among levels in an organisation (Hellriegel et al, 2005:301).
35. Holistic: The theory that certain wholes, are greater than the sum of their parts (Oxford Dictionary:1998).
36. Inductive: generalising to produce a universal claim or principle from observed instances.
37. Inspection: the task of physically measuring, evaluating and correcting deviations from actual results to the stated standards.
38. Integrate: to join two or more objects to make something part of a larger whole.
39. Integration: the various units in the organisation being put back together so that work is coordinated (Hellriegel et al, 2005:300).
40. Leader: somebody who guides or directs others.
41. Leading: guiding or directing others.
42. Manage: the work a person performs in order to realise selected objectives through people in the most efficient manner.
43. Management: the total of the managers in a company, also the work of planning, organising, leading, and controlling the allocation of human, material, financial, and informational resources in pursuit of an organisation's objectives.

44. Management approach: a general overall method/style of management, which encompasses all of the functions of management work.
45. Management intervention: a deliberate effort/input of relative short duration, introduced with the aim to introduce, update or improve specific management performances and techniques such as safety, cost, production, improved human relations, zero based budgeting, activity based costing, linear programming etc.
46. Management programme: a programme, which is directed at the introduction or improvement of a specific management function or skill such as communication skills, negotiation skills, motivation skills etc.
47. Manager: a manager is a person who plans, organises, leads, and controls the allocation of human, material, financial, and informational resources in pursuit of the organisation's objectives.
48. Method: a way of doing something or carrying something out.
49. Model: a simplified version of something complex used in analysing and solving problems or making predictions.
50. Objective: a future planned target aimed for.
51. Optimise: to make something function at its best or most effective or to use something to its best advantage.
52. Organisation: a social entity that is goal directed and deliberately structured (Daft, 1995:13).
53. Organisation design: development of the organisation and structure scientifically and logically to most efficiently realise the objectives of the organisation.
54. Performance: the way, in which something or somebody functions, operates or behaves.
55. Perspective: a measured or objective assessment of a situation.
56. Practical: concerned with actual facts and real life and experience and not theory.
57. Practices: management practices are methods of managing, developed by managers over a long period, utilising available approaches, programs, techniques, interventions and own self-developed management means and preferences.

58. Practitioner: somebody who practises a profession.
59. Profession: the management profession is the application of the management work of planning, organising, leading and controlling with the intention of achieving predetermined desired results in the most efficient manner.
60. Program: a management program is a program, which is directed at the introduction or improvement of a specific management function or skills, such as communication skills, negotiation skills, motivation skills or other.
61. Reductive: seeking to explain complex things in terms of simple structures and systems.
62. Responsibility: an employee's duty to perform the assigned task (Hellriegel et al, 2005:302).
63. Result: an objective realised.
64. Scheduling: the establishing of the time sequence and logical arrangement of tasks for the achievement of the determined tasks for each alternative method in the most efficient manner.
65. Shortcoming: a deficiency as measured against preset standards of performance.
66. Span of control: the number of employees directly reporting to a person (Hellriegel et al, 2005:301).
67. Supervision: the management task of overseeing a task or tasks carried out by subordinates to ensure that it is performed according to or comply with the planned performance standards. It would normally consist of direct and over-supervision.
68. Styles: preferred ways of managing by some managers not necessarily comprehensive and based on proven management practices.
69. System: a combination of related parts organised into a complex whole.
70. Task and resources analysis: the determination of all the resources required to perform each task in order to achieve the most probable achievable results in the most efficient manner.
71. Technique: a deliberate effort or input of relative short duration, introduced with the aim to either introduce, update or improve specific management performances such as safety, cost, human relations, zero based budgeting, activity based management,



72. The organisation chart: a diagram that illustrates the reporting lines between units and people within the organisation (Hellriegel et al, 2005:299).
73. Trigger: a stimulus that sets off an action, process or a series of events.
74. Work: the mental and technical work performed in order to realise one or more planned objectives.
75. Work flow: developing the logical sequential development of the necessary tasks to realise an objective in the most efficient manner.

## CHAPTER 1

### SCOPE OF THE THESIS

#### 1.1 INTRODUCTION AND BACKGROUND

According to the Chamber of Mines of South Africa (COM) the South African mining industry had since its inception made an extremely important contribution to the social development and national economy of the country (COM, Annual Report, 2006 - 2007:12). It was and still is the largest industry sector in the country and is widely being recognised as a leading supplier, producer and exporter of a great variety of minerals (refer section 1.2.6 and table 1.2). It is a major employer and source of income to employees and the state (COM, Facts and figures, 2006 - 2007:13 and section 1.2.7.2). The industry played and still continues to play a valuable leadership role in many local and worldwide safety and efficiency improvement projects (refer section 1.2.7.1).

According to the Department: Mineral and Energy (DME) the South African mining industry provided the stimulus for the extensive development of an efficient physical infrastructure that greatly contributed to the development of related secondary industries in the country (DME, South Africa's Mineral Industry, 2004/2005:1). It holds, in comparison to total world reserves, a dominant position in many mineral reserves, production and exports (refer table 1.2). The industry developed a high degree of technical expertise and the ability to mobilise large amounts of capital for the development of new projects (DME, South Africa's Mineral Industry, 2004/2005:1).

Like other industries the industry also operates within industry-specific environmental factors and challenges. Its performance is adversely being affected by increasingly complex geological conditions, labour demands, local and global competition and the fluctuation in the R/\$ exchange rate. In addition skills shortages, increasing social commitments, rising input costs, new laws, mandatory black economic empowerment and inadequate infrastructure and unreliable energy and water supplies further aggravate the situation (COM, Annual Report, 2004 – 2005:30-83).

With the advent of the democratic dispensation in South Africa in 1994 many new acts had been introduced. The Mineral and Petroleum Resources Development Act (MPRDA) was promulgated in 2003. The industry had since then to comply with all the changes, demands and challenges of the new and revised mineral acts (DME, South Africa's Mineral Industry, 2004/2005:3-4).

The South African mining industry had, for a very long period, been one of the leaders in the global mining arena. Global competition in the meantime increased significantly over the years and became a reality that should be efficiently managed in the future. More recently the opinion was expressed that the industry's position as a cheap supplier of various minerals to world markets is deteriorating at an alarming rate (COM, Annual Report, 2004 - 2005:22).



In spite of major improvement programs the industry is still loosing ground relative to the leading mining countries in the world (COM, Annual Report, 2004 - 2005:22). Mine management in general is of the opinion that existing management practices being utilised by the industry, are inadequate to enable it to manage in a comprehensive manner (refer section 4.2.1). It would appear that an all-inclusive management practice that could be utilised by the mining industry does not exist at present. It is perceived that none or not even a combination of the existing management practices would constitute a complete logically integrated management practice. With increasing globalisation and competitiveness, competent management and employees are becoming more than ever before indispensable to the success of the South African mining industry.

The author of this thesis believes that the ideal management method should consist of an appropriate theory and procedure in order to be successfully applied by every employee in the South African mining industry on each level of the organisation. It should enable all the employees on all the levels in the organisation to comprehensively manage the achievement of the results required from each one of them. It implies that all the required work should be efficiently planned for, coordinated, integrated and executed by every employee on every level of the organisation. It is perceived that the industry is in dire need for such a management method. The question of whether and how such a method could be developed would form the crux of this thesis.

In this chapter the commencement, development, importance and role of the mining industry in the South African economy and the factors and challenges facing the industry are briefly discussed. The management practices applied since the inception of the South African mining industry up to the present and specifically an efficient management method perceived for the future would be researched. The research problem, hypotheses, questions and objectives of the study and the key attributes of the desired theory and derived method would be specified. Finally a proposed layout of the study would be given.

## **1.2 HISTORICAL DEVELOPMENT AND CURRENT STATE OF THE MINING INDUSTRY IN SOUTH AFRICA**

### **1.2.1 The role of mining in the development of mankind**

Mankind developed the ability to identify and utilise natural resources of one kind or another in order to manufacture elementary objects such as weapons and utensils for use in its daily activities. The sophistication and efficiency of these crude objects increased over a long period of time with the invention of more advanced stone utensils (Wells, 1961:66-79). The earliest stone tools to date, discovered in Southern Africa, date from the early Stone Age period of about 15 million years ago (COM, Annual Report, 2002 - 2003). Later Stone Age artefacts such as bored stones and grindstones were used for grinding ochre and food and for digging out plant bulbs. According to Kloppers (2001:5) primitive stone tools were discovered during the late twentieth century at the Park Town area in the present city of Johannesburg, indicating that humans inhabited this area approximately 1.2 million years ago.

The early settlers brought with them the knowledge of how to smelt iron and copper ores in furnaces fuelled by wood and self-made charcoal in order to manufacture crude tools, utensils and weapons. Ore deposits, where too deep to extract from the surface, were in many places exploited by means of a simple system of small tunnels and underground excavations or stopes (COM, Annual Report, 2002 - 2004:48). Ancient tin workings had been discovered north of the Limpopo River, at Rooiberg, Leeuwpoot and Weynek in the Waterberg District. Some of these workings extended to depths of 70 meters (Jeppe, 1946:6-7).

Ashton (1997:129) pointed out that mining, in its infant stages with relatively unproven methods, caused a lot of hardship to people but that it eventually resulted in much better living conditions for countries, peoples and communities. In Britain, one of the very first 'mining' countries in the early days, it was not regarded as unusual or unethical to use boys as young as eight years to work underground under dangerous and hazardous environmental conditions. In those days it was believed that the history of Britain's mining industry was the history of the rise of Britain to the pinnacle of industrial supremacy in the world. Its claimed riches and greatness were built on coal, the most important mineral asset of the country (McCutcheon, 1974:v).

It would appear that a country endowed with relatively large mineral deposits has an added advantage over less fortunate countries. It stands to reason that such a country could not only extract and export some of its excess minerals but that it could also beneficiate and utilise it for manufacturing purposes. It invariably creates employment and labour stability. South Africa is one of the leading countries in the world in the production and export of minerals to a great number of countries (refer section 1.2.6.2 and table 1.2). It still has large mineral reserves (refer section 1.2.6.1). Its rise to the status of a first world country in a relatively short period of time could to a large extent also be attributed to the contribution of its mining industry (COM, Annual Report, 2004 - 2005:14).

Mining materialised many centuries before the advent of the so-much-acclaimed Industrial Revolution. Unfortunately no exact record of the commencement of mining exists. The history and progress in mining expertise is most probably best described in Agricola's popular and detailed account of the mining discipline in his book '*De Re Metallica*' originally published in 1556 and translated in English in 1950 by Herbert and Lou Hoover (Agricola, 1556:1-638).

## **1.2.2 The geology of South Africa**

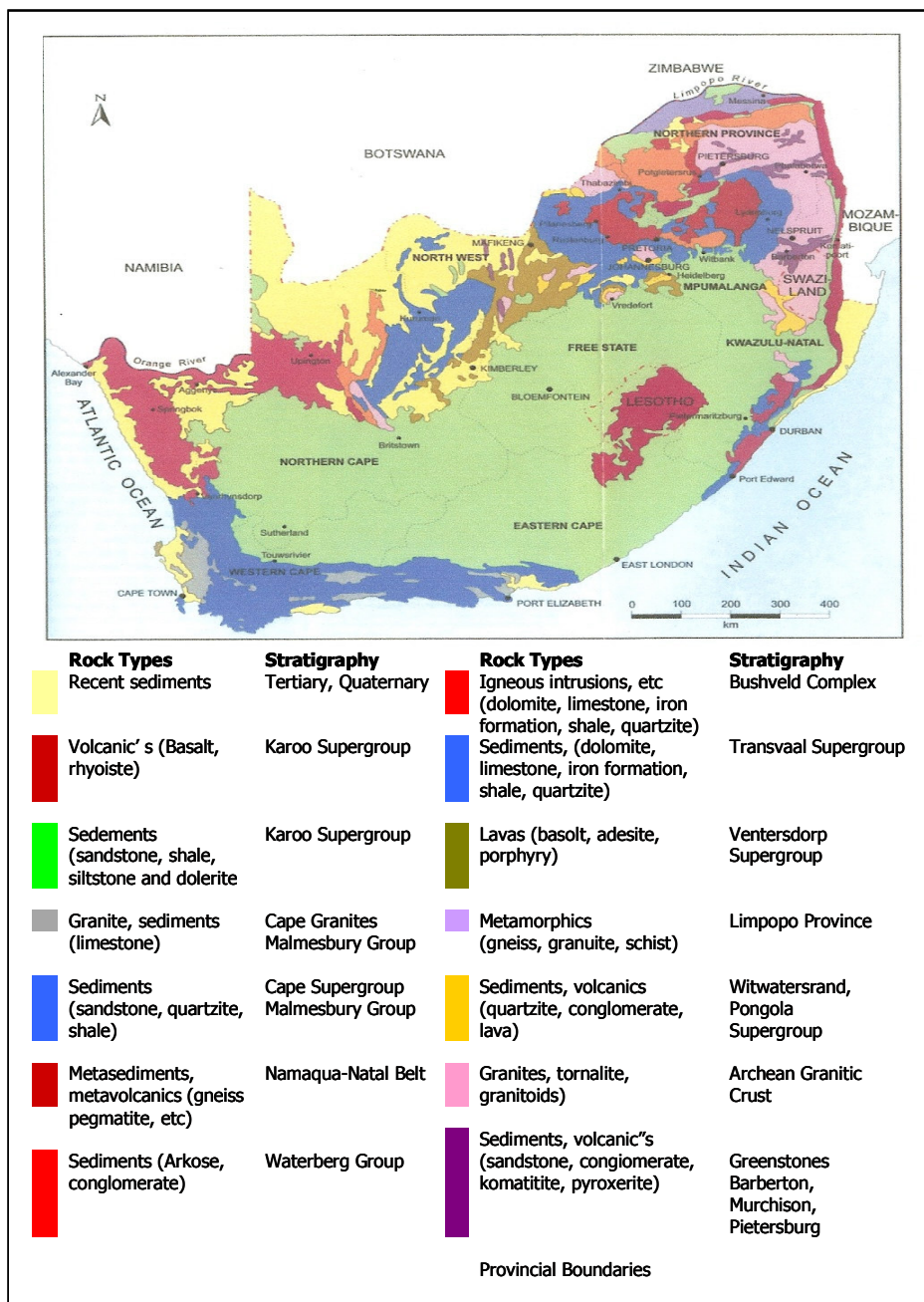
### **1.2.2.1 The geological history of Southern Africa**

The geological history of Southern Africa dates back to approximately 3 700 million years ago (refer figure 1.1). The Central Rand Group strata, deposited between 3 074 and 2 714 million years ago, contained an estimated 82 000 tons of gold metal when it was discovered in 1886 (refer section 1.2.4.1). According to MacRae (1999:64) approximately 40 000 tons of this gold had been casted since then to the end of 1 999 (refer table 1.1).

Gold had been discovered and mined in the Barberton area since the 1870s. It was and still is predominantly being mined in the Witwatersrand area. Many more discoveries of different minerals were made in later years in many other parts of the country.

### 1.2.2.2 Main geological formations

The main geological formations were developed on the Kaapvaal Craton, which occupies the north-eastern part of the country (refer figure 1.1). At present most of these formations are being exploited.



**Figure 1.1: The geological map of South Africa**

Source: Viljoen & Reimold (1999:2)

According to the DME (South Africa's Mineral Industry, 2004/2005:4-5) the mineral wealth of South Africa is largely contained in the geological formations of the:

- a) Witwatersrand Basin which hosts a considerable portion of the world's gold, silver, uranium, pyrite and osmiridium,
- b) Transvaal Supergroup containing large deposits of iron and manganese ore,
- c) Bushveld Igneous Complex which contains more than half of the world's reserves of chrome ore and platinum-group metals (pgms) as well as considerable deposits of vanadium, iron, copper, titanium, fluorspar and nickel ore,
- d) Palabora Igneous Complex containing large deposits of phosphate, iron, copper, titanium zirconium and vermiculite ores,
- e) Karoo basins in the provinces of Mpumalanga, KwaZulu-Natal and Limpopo hosting extensive coal and anthracite deposits,
- f) Kimberlitic, alluvial and marine formations hosting diamonds, and
- g) Heavy mineral sand occurrences, containing titanium minerals, zircon and iron.

In South Africa relatively young deposits, ranging from 70 million years to a few thousand years ago, are abundant. Amongst these are the Kalahari Group sediments, coastal and shallow marine and lagoonal sediments as well as present and ancient river terraces. Many important minerals are concentrated in these alluvial deposits, including diamonds along the Vaal River and at the mouth of the Orange River.

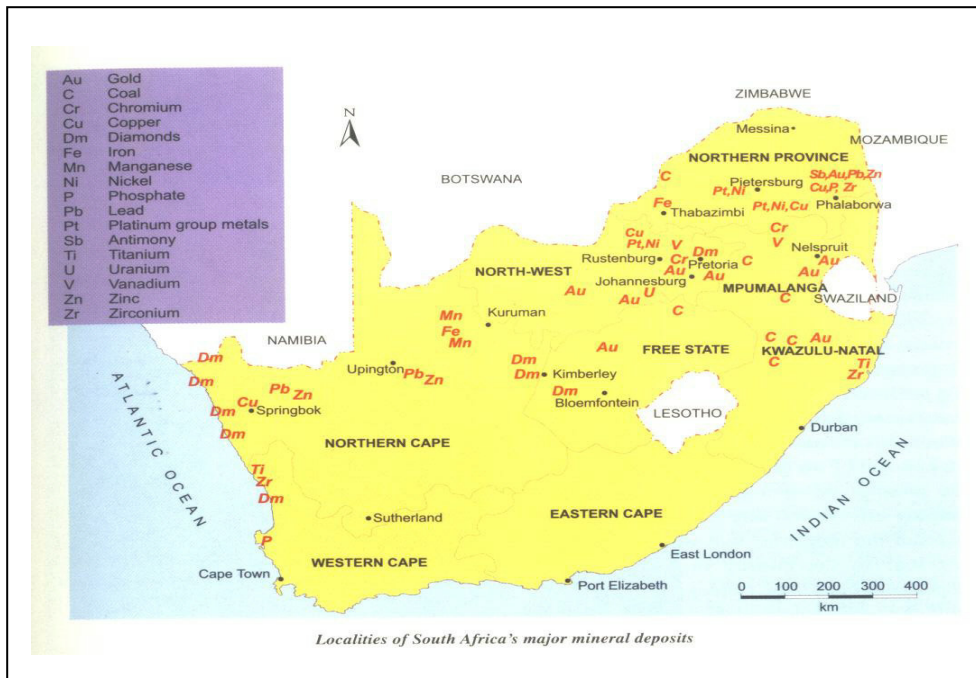
South Africa is world wide renowned for its major reserve deposits and as a supplier of valuable minerals and metals to the world markets (refer section 1.2.6 and table 1.2). It is frequently being visited by interested parties from abroad. It has an abundance of unique geological features and is renowned internationally for this. Earth scientists from all over the world frequently visit the country. It had become increasingly important to optimise the utilisation of resources to the benefit of the country, its inhabitants and the world economies at large (refer Viljoen & Reimold, 1999:12-13).

### **1.2.2.3 Mineral deposits**

The mineral deposits, in particular the older ones, provided valuable geological information and form a basis for the development of future exploratory initiatives. Previous courses of rivers, past plant and animal life and changes in sea level and the climate were determined by means of this newly developed geological science. In South Africa ample geological deposits exist. It mainly includes the major marine alluvial formations hosting diamonds and heavy mineral sand occurrences containing titanium minerals, zircon and iron (refer section 1.2.2.2 (g) and figure 1.2).

Diamonds together with many other minerals are contained in the alluvial deposits along the Vaal River and at the mouth of the Orange River. Heavy minerals such as titanium and zirconium are found in sand dunes and beach deposits at places around the coastline. Large reservoirs of natural gases were identified in recent sediments off the Southern Cape coast. Natural pan forming produced many pans in the country. Some of these pans, especially the salt pans are being

economically exploited. The Pretoria ‘salt pan’ north of Pretoria represents the Crater Lake in a 220 000-year-old meteorite impact crater (Viljoen & Reimold, 1999:13).

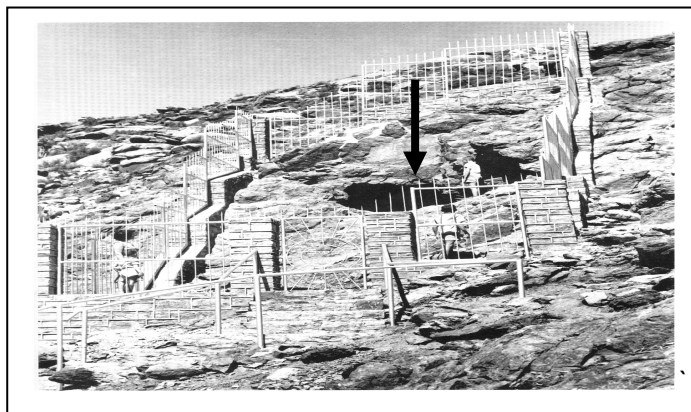


**Figure 1.2: Major mineral deposits in South Africa**

Source: Viljoen & Reimold (1999:13)

### 1.2.3 Commencement of the mining industry in South Africa

South Africa’s involvement with minerals officially commenced in 1686 when Simon van der Stel, the first governor of the Dutch Settlement in Table Bay discovered promising copper ore deposits approximately seven kilometres east of the present town of Springbok in the Northern Cape Province (refer figure 1.3). In addition an insignificant coal deposit was discovered in 1699 in the Franschoek Valley to the east of Stellenbosch (Lang, 1995:13).

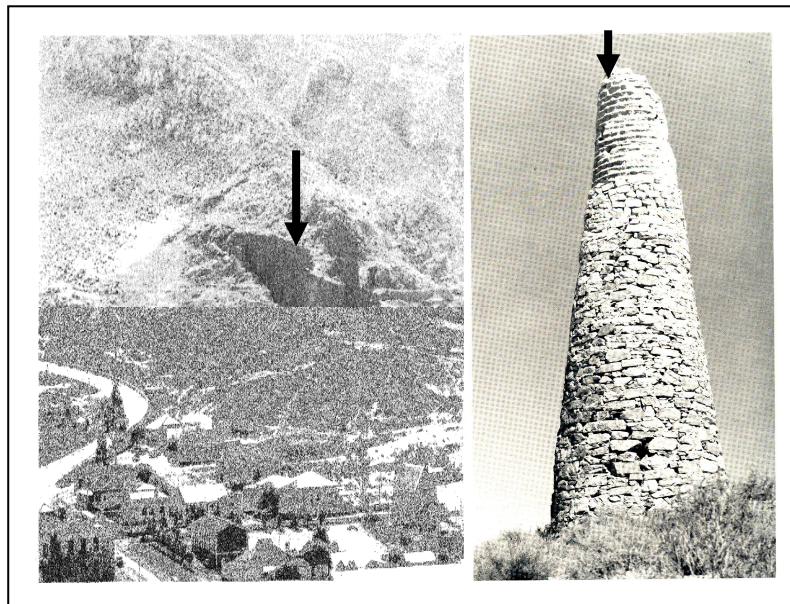


**Figure 1.3: Historical monument – Simon van der Stel mine**

Source: Van Niekerk (1984:5)



According to Lang (1986:6) modern mining in South Africa can be traced back to 1852 when systematic attempts were being made to recover the copper deposits in the Northern Cape discovered by Van der Stel in 1686. The first mine in South Africa, the 'Blue Mine' was established on the western outskirts of the present town of Springbok (refer figure 1.4). Initially the copper ore was transported in bags by means of wagons to Hondeklip Bay on the West Coast, the nearest navigable port to the sea. Since there were no decent roads a special road 'the copper road' had to be constructed. In order to minimise the losses of copper ore en-route and the cost of transportation a smelter was constructed where the ore was smelted and casted into bars for more economical transportation (refer figure 1.4).



**Figure 1.4: The 'Blue Mine' – First mine and smelter chimney in South Africa**

Source: Van Niekerk (1985:9-11)

The fuel or firewood was supplied from local sources (Van Niekerk, 1984:9-11). The mine became the main source of employment mainly to the local inhabitants. Technical experienced staff was imported mainly from the United Kingdom. Since 1852 the mining industry grew from this one mine to a total of 993 mines and quarries in 2004 (DME, South Africa's Mineral Industry, 2004/2005:1).

In 1803, the British permanently occupied the Cape Settlement, which was under Dutch control for 150 years. Many of the farmers, tired of across border raids in the Eastern Cape and British rule, left their farms and began with the Great Trek to Natal in 1836. These Voortrekkers settled in areas unoccupied and areas acquired from the local chiefs. When Britain declared the Natal Province a Crown colony in 1844 the Voortrekkers trekked over the Orange and Vaal rivers and established the Republics of the Orange Free State and the Zuid-Afrikaanse Republiek respectively (Cartwright, 1962:12). These republics were declared independent Boer Republics in 1854 and 1852 respectively.

The Trekkers developed their farms and gradually established the basic infrastructure. At the end of the second Anglo-Boer War in 1902, the British took also permanent control over these Republics. In May 1910, the Union of South Africa was established. Most of the mineral deposits were discovered in these republics and are still being exploited to date. In 1994 a democratic dispensation was established in South Africa.

### 1.2.4 Development of the South African mining industry

The development of the eight largest mining sectors, employing an average of 430 437 people (94 per cent) of the total labour in the mineral industry and generating sales of R170.404 billion (89.43 per cent) of the total mineral sales in 2006 were discussed briefly (refer table 1.1). As the diamond sales income in South Africa was not available the value of the sales was estimated from the 2006 total world diamond sales value (refer COM, Annual Report, 2006 - 2007:18).

Year: 2006	Performance			
Main Mineral Sector	Production		Sales (Rbillion)	Labour
Gold	272.1	Metric tons	37. 443	159 984
Coal	244.762	Million tons	37.991	57 777
PGMs	307.5	Metric tons	65. 444	168 479
Iron	41. 326	Million tons	9. 928	8 848
Chromium	7.418	Million tons	2.302	7 901
Manganese	5.213	Million tons	2.246	3 340
Diamonds	15.4	Million carats	10.08 1)	20 115
Copper	109.6	Kilo tons	4.956	3 993
Total			170.404	430 437
Total Mining			190.545	458 600

Note: 1) = Calculated value (COM, Annual Report 2006 – 2007:18)

**Table 1.1: Main mineral sectors**

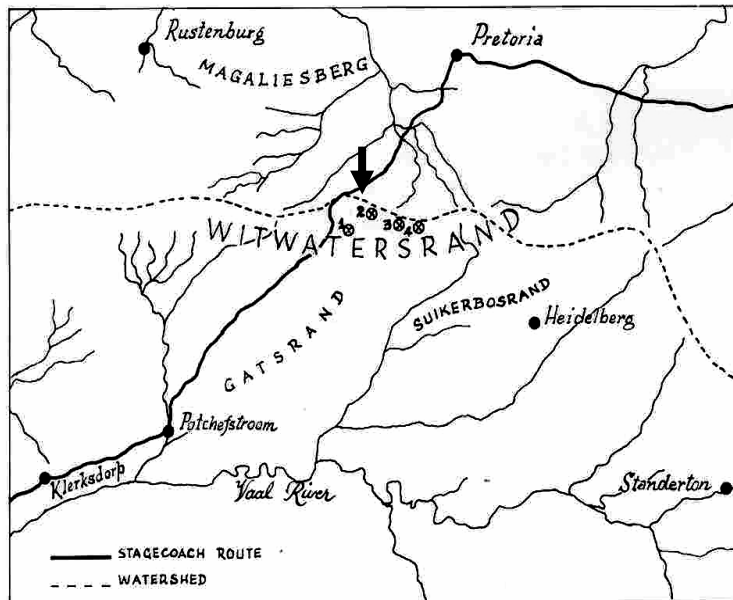
Source: DME, Minerals Statistical Tables (1985 - 2006)

#### 1.2.4.1 The gold mining sector

The Lydenburg Gold Prospecting Company at Spitskop in the Eastern Transvaal first carried out successful alluvial gold mining in 1871. Alluvial gold was also discovered in 1873 at Eersteling, Lydenburg, Sabie, Pilgrim's Rest and Barberton (Scannell, 1988:3). Marx (1987:17) reported that gold was also discovered in November 1885 by Marthinus van Vuuren on the farm Ysterspruit near the present town of Klerksdorp. George Harrison and George Walker were generally being credited with the discovery of the major gold bearing deposits of immense values and quantities in March 1886 on the farm Langlaagte (refer figure 1.5 area indicated by arrow) a few kilometres west of Johannesburg (Viljoen & Reimold, 1999:33). These were deposited between 3 074 and 2 714 million years ago in the Witwatersrand Geological Basin and are regarded as the largest repository of gold in the world (Wilson & Anhaeusser, 1988:1). The occurrence was later found to be extending as far south as the present Klerksdorp and Welkom areas.

Mainly because of the steep gradients of some of the gold-bearing deposits (reefs) mining conditions changed relative rapidly with the resulting structural problems and increasing financial requirements. Fortunately the scope of mining geology and access to deep formations and new areas literally exploded worldwide after 1850 (Peters, 1978:7). Mining technology with newly invented tools such as the power hoist and the Cornish pump, created the possibility to open up deeper deposits so that theories of mineral zoning and structural control could at that time already be tested to depths in excess of 1 000 meters below the surface. In South Africa, especially in the Witwatersrand area, these inventions held great promise in the quest to efficiently exploit the steep declining gold bearing deposits and in general all deep mineral deposits.

The Southern Transvaal straddled the Witwatersrand watershed, surmounted by farms such as Randfontein (1) Roodepoort (2) Langlaagte (3) and Doornfontein (4). These farms are depicted in figure 1.5 immediately above the Witwatersrand. They had since 1886 been the major areas of gold mining operations and a few are to some extent being exploited to date.



**Figure 1.5: The Southern Transvaal in 1886**

Source: Hocking (1986:16)

Huge amounts of capital, skilled and unskilled labour and new technologies were necessary to extricate the gold ore from the earth. It became evident, quite early in the development of the industry, that individuals could not economically mine the deep gold bearing deposits. Individual claims were amalgamated, on an average of 200 claims in size per producing company. The mining house concept that commenced on the Kimberley diamond fields was brought to the Witwatersrand where it, because of the huge capital requirements of establishing deep mining operations, developed to its final practical stage (Handley, 2004:79-80).

The gold mining sector was, since its commencement in 1886 until 2004, the largest mineral sector in respect of sales income at which time it was superseded by the platinum-group of minerals (pgms) sector. From 1887 to 1894 the sales from gold increased from £81 022 to £6 959 622



respectively (Cartwright, 1962:116). In 1961 the country was the top gold producer with 65.6 per cent of the total world output (Cartwright, 1962:326). Since 1985 the annual gold production has declined from 672.9 to 272.1 metric tons in 2006, the lowest level of production since 1931 (DME, Minerals Statistical Tables, 1985 – 2006:1). The decline can be attributed to increasing production costs, gradual depletion of the higher-grade ore, decreasing reserves of the existing mines and the restructuring and closing of some uneconomical mines (COM, Annual Report, 2004/2005:20-22). Despite this sharp decline the South African gold sector still remains the largest single supplier of gold in the world (COM, Annual Report, 2006 - 2007:20).

The sales income from gold increased from R15.291 billion in 1985 to R37.443 billion in 2006 (DME, Minerals Statistical Tables, 1985 - 2006:1). It employed an average of 159 984 people in 2006 (DME, Minerals Statistical Tables, 1985-2006:22). From 1888 to 1944, the tons milled by the Witwatersrand gold mining industry increased from 114 000 to 58.504 million tons. During the same period the ounces of fine gold produced increased from 171 789 to 11.993 million ounces respectively (Jeppe, 1946:24-26).

#### **1.2.4.2 The coal mining sector**

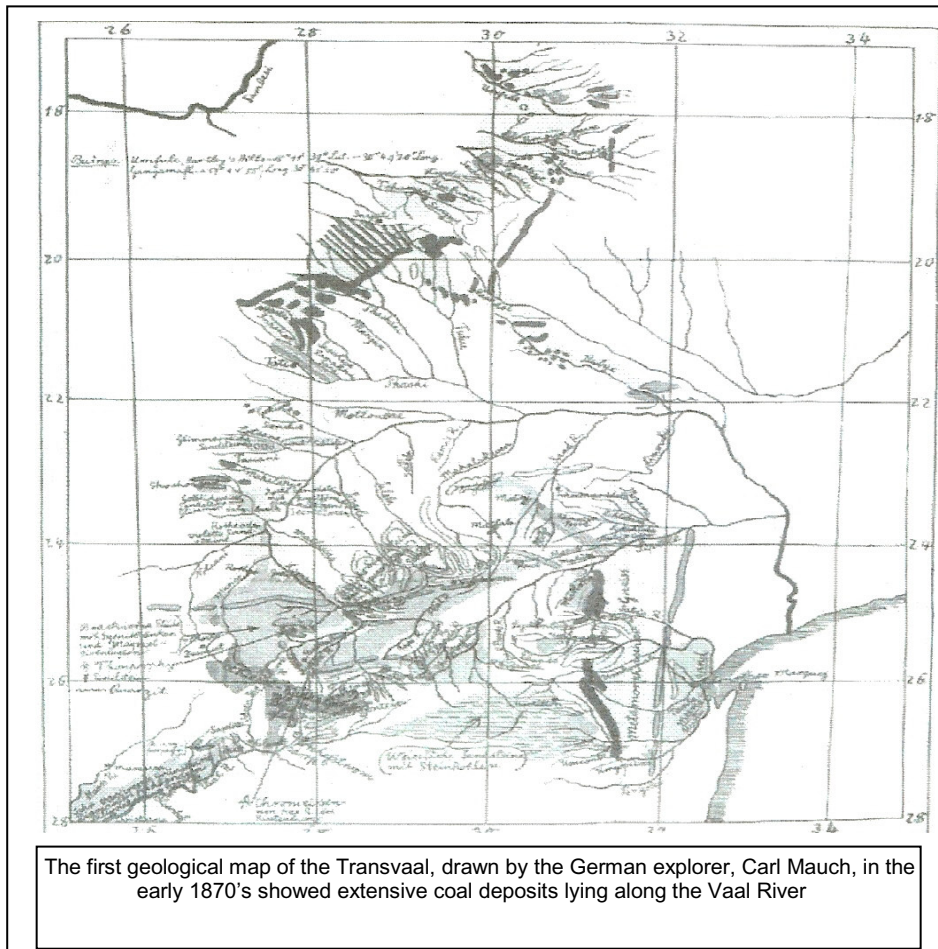
Coal mining, commenced in 1859 at Cyfergat near Molteno (Lang, 1995:13-17). According to Oosterhuis (Wilson & Anhaeusser, 1998:136) the first economical exploitation of coal commenced in 1870 from this now dormant coalfield. In 1877 the large deposits of Natal and the Transvaal were known and their value realised.

In 1872, coal had been discovered in the then Zuid- Afrikaanse Republiek. As from 1877, small quantities of coal were transported by ox wagon from the Wilge and Olifants Rivers near Middelburg to the Witwatersrand. George William Stow discovered coal in 1878 in Vereniging in the Republic of the Orange Free State (Leigh, 1968:13). Carl Mauch, a German geologist and prospector who travelled extensively in Africa and especially in Southern Africa produced the first geological map of Transvaal in 1870 (refer figure 1.6).

The mineable coal reserves of the country was calculated in 1952 and in 1959 at 74.872 and 79.882 billion Cape tons respectively. In 1972 the Petrick Commission, submitted their report on the coal reserves of the Republic of South Africa, to the then State President, J.J. Fouche. The total soft and hard coal reserves were then calculated at 81.274 billion mineable metric tons (Petrick et al, 1975:7).

The country's hard coal reserves of 48.9 billion tons were considered to be the world's fifth largest hard coal reserves (COM, Annual Report, 2006 - 2007:15). Initially coal mining was almost exclusively restricted to underground mining methods but a considerable amount is nowadays being extracted by means of the opencast mining method. Currently approximately 53 per cent of the total coal production emanates from opencast mining operations (COM, Annual Report 2006 - 2007:17). In 2006 the coal mining industry, with a production of 244.8 million tons and a total sales income of

R37.991 billion, was the second largest mineral sector in South Africa. It was ranked in the fourth place in the world as a coal exporter. It employed an average of 57 777 employees (refer tables 1.1 and 1.2).



**Figure 1.6: First geological map of the Transvaal**

Source: Lang (1995:48)

Coal provided approximately in 70 per cent of the county's primary energy needs in 2006. It accounted for 93 and 37 per cent of the country's electricity and local liquid fuel production respectively (COM, Annual Report, 2006 - 2007:15). The contribution of the domestic and industrial use of coal to the increasing global warming problem may result in a possible forced future decline in the consumption of coal and the resulting reduction in the production of this mineral.

#### 1.2.4.3 The platinum mining sector

According to Viljoen & Schürmann (Wilson & Anhaeusser, 1998:534) recovery of the platinum group of metals (pgms), mainly as a by-product from the gold mining industry through metallurgical processes, commenced at the Witwatersrand during June 1919. It was by that time known to be available in the well-known extensive Bushveld Igneous Complex.

Platinum was panned in 1924 on a farm in the Lydenburg area. This was the first discovery of the Merensky Reef. The Bushveld Igneous Complex became the largest resource of platinum and associated minerals in the world. In 2004 it replaced gold as the largest export commodity.

The production of the platinum group of metals has increased from 121.7 metric tons in 1985 to 307.5 metric tons in 2006 (DME, Minerals Statistical Tables, 1985 - 2006:2). The total sales value for 2006 was R65.444 billion. In 2006 this sector employed an average of 168 479 people (DME, Minerals Statistical Tables, 1985 - 2006:22).

#### **1.2.4.4 The iron metals mining sector**

Iron is one of the most abundant elements in the earth's crust. Astrup et al (Wilson & Anhaeusser, 1998:402) listed the Sishen and Beeshoek Mines in the Northern Cape and the Thabazimbi and Palabora Mines in the Northern Province as the major iron-ore mines in South Africa. World steel production has increased by 9 per cent to 1.2 billion tons in 2006. South Africa was the 8th largest producer of steel in the world in 2006 at 41.326 million tons (COM Annual Report, 2006 - 2007:21). The demand for steel is still increasing annually world wide

This sector employed an average of 8 848 people (refer table 1.1). The sales income from steel increased from R474 million in 1985 to R9.928 billion in 2006 (DME, Mineral Statistical Tables, 1985 - 2006:5).

#### **1.2.4.5 The chromium mining sector**

According to Schürmann et al (Wilson & Anhaeusser, 1998:90) chromium was first discovered in 1865 by Carl Mauch in South Africa where the Bushveld Igneous Complex outcropped in the Hex River near Rustenburg. The production of chromites commenced in 1924 in the Steelpoort and Burgersfort areas. The Bushveld Igneous Complex contains the largest deposits of chromium in South Africa (Wilson & Anhaeusser, 1998:90). South Africa only became a major force in the chromium industry in the 1960s. The production increased from 3.699 million tons in 1985 to 7.418 million tons in 2006 (DME, Minerals Statistical Tables, 1985 - 2006:3). The total sales value in 2006 was R2.302 billion. In 2006 this sector employed an average of 7 901 people (DME, Mineral Statistical Tables, 1985 - 2006:23).

#### **1.2.4.6 The manganese mining sector**

Astrup and Tsikos (Wilson & Anhaeusser, 1998:450) stated that manganese ore was mined at Hout Bay near Cape Town early in the 1900s. In 1922 the manganese ore deposits near Postmansburg in the Northern Cape Province were being exploited. Shortly afterwards the massive Kalahari Manganese Field (KMF) further north was identified and in 1940 the Black Rock Mine, near the present town of Kuruman, was opened. The total South African manganese resources were calculated as over 1 000 million tons. The total world resources were estimated at 4 900 million

tons. In 2006 this sector produced 5.213 million metric tons at a total sales value of R2.246 billion (DME, Mineral Statistical Tables, 1985 - 2006:6) and employed an average of 3 340 people (DME, Mineral Statistical Tables, 1985 - 2006:24).

#### **1.2.4.7 The diamond mining sector**

Diamonds were discovered in 1867 in the kimberlitic pipes near the present town of Hope Town and in 1871 at the present town of Kimberley. Since then these mines produced diamonds in large quantities and value. The Premier kimberlite was opened in 1902 near the town of Cullinan approximately 25 kilometres east-northeast of Pretoria.

Fred Wells, a mine employee, found the largest diamond in the world on 5 January 1905 at the Premier Mine. It weighed 3 106 carats and was named the Cullinan diamond (Cartwright, 1977:60 - 61).

According to Möller (1999:126) the diamond fields, including the Kimberley Mines, were originally part of the Republic of the Orange Free State's geographical area but were shortly after the discovery of the diamonds illegally expropriated by Britain. The Republic was later, after it won the court case, remunerated with a mere R180 000 by Britain for the loss of this geographical area and the diamond fields (Möller, 1999:100-101).

In 1928 extensive diamond bearing alluvial deposits were discovered on the West Coast, north and south of the Orange River estuary (Oberholzer, 1985:15). Since then many more discoveries were made. According to Lynn (Wilson & Anhaeusser, 1998:252) South Africa would remain to be one of the major suppliers of gemstones and industrial diamonds in the world for the foreseeable future.

The total world production of natural diamonds for 2006 with a value of approximately US\$13.1 billion exceeded 171 million carats (Mct). South Africa's official rough diamond production was 15.4 Mct in 2006. The country is presently being rated, jointly with Angola and Canada, as the third largest in terms of the production of diamonds (COM, Annual Report, 2006 - 2007:18). The sales income for the diamond mineral sector in South Africa for the year 2006 was unfortunately not directly available and was consequently calculated at R10.08 billion from the total world production and sales (refer table 1.1). This sector employed an average of 20 115 people in 2006 (DME, Minerals Statistical Tables, 1985 - 2006:21).

#### **1.2.4.8 The copper mining sector**

According to Wilson (Wilson & Anhaeusser, 1998:209-226) several hundred copper ore occurrences were identified in South Africa. Most of these were not of economical value. A massive copper-bearing ore body was discovered near Prieska, where the Prieska Copper Mine was later established in 1968 (Hocking, 1999:141-146). The other identified viable deposits were at Palabora,

Messina, the Bushveld Igneous Complex, Soutpansberg, O'kiep Copper District, Aggeneys and Gamsberg and the Uitkomst complex.

In 2006 a total of 109 600 tons of copper was produced at a sales value of R4.956 billion (DME, Minerals Statistical Tables, 1985 - 2006:4). This sector employed an average of 3 993 people in 2006 (DME, Minerals Statistical Tables, 1985 - 2006:23).

### **1.2.5 Early mining problems encountered**

Mining is, to a large extent, carried out under hazardous conditions unnatural to the human being (refer section 1.2.5.1 and 1.2.9.1). As an industry it requires specific mining methods and specialised equipment. The initial mining problems encountered with the inception of the mining industry are briefly discussed below.

#### **1.2.5.1 Mining conditions**

Prior to 1886 deep mining was not practiced anywhere else in the world. The first experience with deep mining, in excess of 2 000 meters, occurred on the Witwatersrand goldfields. Pritchard (2001:11) pointed out that mining as an important industry had the disadvantage of detrimental environmental and health consequences. It is a complex operation, involving high risks and uncertainties, which must be identified timeously and managed efficiently by all the responsible employees on all the organisational levels of the organisation.

Initially there were many unknown factors, which were directly and indirectly responsible for many small and major disasters. As a result of extensive research and constant vigilance on results of newly developed and improved applied techniques, equipment and practices, safer and more productive extraction methods were developed and introduced. Involvement from experienced consultants and contributions by local institutions and abroad further contributed to mines now being operated on a more scientific, economical, productive and safer basis (COM, Annual Report, 2003-2004:103-113).

#### **1.2.5.2 Transportation**

In the beginning the inadequacy of the transport systems presented serious problems. The stagecoach route running from Cape Town through Klerksdorp and Potchefstroom to Pretoria was the first official known route (refer section 1.2.4.1 and figure 1.5). In order to improve the transport system the 'Rand Train', running from Krugersdorp to the present town of Springs, was built and commissioned in 1891. In the same year, the railway from Pretoria to Johannesburg was commissioned. In 1892, the railway from Johannesburg to the Cape via the then Orange Free State Republic was completed. It was followed by the railway connections to Delagoa Bay and Durban in 1894 and 1895 respectively (Lang, 1995:21-27). These new transportation facilities not only boosted the mining industry but also the development of the country in general.



### **1.2.5.3 The early labour situation**

Approximately 70 per cent of the white miners in the early days were from British and Australian origin. Most of the miners belonged to a labour union (Cartwright, 1962:155-186). According to Cartwright (1962:162) the House of Assembly of the new Union Government passed the Mines and Works Act in 1911. This Act reserved all skilled and some semi-skilled occupations in the mining industry for white workers only.

South Africa at the time had a serious shortfall in skilled and managerial occupations. It relied almost entirely on recruits with technical and engineering education from mainly Britain and Australia. The shortage in skilled technical labour, especially mechanics, miners and general labourers, took some years to overcome (Jeppe, 1946:24).

From 1899 to 1902, production on the gold mines was seriously interrupted by the Anglo-Boer war. After the war the mining industry was experiencing shortages of food supplies, capital, a damaged transport structure and a severe shortage of labour, especially skilled labour. As a result a total of 63 000 Chinese labourers was imported as from 1905 (Scannell, 1988:8). They were all repatriated by the end of 1910 mainly due to friction between them and the local people (Palestrant, 1986:85). The Chinese workers, however, were productive and contributed considerably to increasing the soaring of the gold output to £16 million in 1904, £20.8 million in 1905 and to £24.6 million in 1906 (Cartwright, 1962:138).

The first miner's strike, organised by the Transvaal Miner's Association as this union was then called, was in 1907. It came not long after the Transvaal Province had held its first election. The reason for calling the strike was over unilateral changes by the owners to the mutually negotiated labour agreement (Cartwright, 1962:159-160). In 1913, the first general strike over working hours, to some extent violent and with great loss in production, income and profit, took place. The most remembered industry wide strike, or the Rand Revolt as it was also known, took place in 1922. Due to the worldwide drop of the gold price caused by a worldwide recession and the increasing labour costs on the mines the mine owners unilaterally decided to lower the colour bar and to reduce the labour complement. The labour unions reacted to this unilateral decision by calling out a general strike, which lasted 83 days. The loss in production, income and profits to the mining industry was enormous. A total of 230 lives were lost and indescribable pain and hardship was caused to the families of the deceased and in general to that of the workers (Cartwright, 1962:196-209). The government suffered great losses in taxes.

### **1.2.6 Importance of the South African mining industry to the world**

South Africa holds extensive mineral resources and ranks as a leading world producer and exporter of a large range of minerals (refer table 1.2). In 2004 the country produced some 59 different minerals from a total of 993 mines and quarries of which 49 produced gold, 28 platinum-group minerals, 64 coal and 145 diamonds (DME, South Africa's Mineral Industry, 2004/2005:1). It ranks

as one of the largest mineral producing countries in the world in many strategic important minerals. According to Ramontja (Mining Mirror, Vol. 17 no 6, 2004:21) South Africa contributed 15 per cent of the world's gold supply in 2003.

Commodity	Resource base †		Production		Export	
	%	Rank	%	Rank	%	Rank
Aluminium +	*	*	2.7	9	4.2	7
Alumina-silicates	*	*	36.4	1	34.4	1
Antimony	6.4	4	3.2	7	*	*
Chrome ore	72.4	1	38.7	1	15.1	4
Coal ‡	10.2	5	4.93	5	9.3	4
Copper	1.4	14	0.7	16	*	*
Ferrochromium	*	*	40.5	1	50.9	1
Ferro-alloys of manganese	*	*	6.0	4	16.4	2
Ferrosilicon	*	*	3.1	6	2.1	7
Fluorspar	16.7	2	*	*	*	*
Gold	40.1	1	11.7	1	*	*
Iron Ore	0.9	9	3.0	7	3.8	6
Lead	2.0	7	1.2	13	*	*
Manganese	80.0	1	13.3	2	19.7	2
Nickel	8.4	5	3.1	9	*	*
PGMs	87.7	1	56.7	1	*	*
Phosphate Rock	5,0	4	1.7	10	*	*
Silicon Metal	*	*	3.2	8	3.7	7
Silver	*	*	0.4	17	*	*
Titanium minerals	18.3	2	19.8	2	*	*
Uranium	7.2	5	1.6	11	*	*
Vanadium	31.0	1	48,0	1	*	*
Vermiculite	40.0	2	39.6	1	*	*
Zinc	3.3	8	0.3	22	*	*
Zirconium	19.4	2	*	*	*	*

Note: † Figures under resource base refer to metal production capacity, an equivalent of SAMREC's reserves. ‡ World hard coal reserves 2006 (BP Energy statistics) \* Confidential or unavailable information

**Table 1.2: South Africa's role in world mineral resources, production and exports, 2005**

Source: COM, Facts & figures (2006: 8)

### 1.2.6.1 Mineral deposits

Concern had been expressed at the possible uncontrollable exploitation of the dwindling reserve base of South Africa. It was argued that it was a national asset that should be managed responsibly in order for the country to optimise the benefit of it for a longer term. According to geologists the reserve base of the country is not considered over-explored. Geological institutions in general maintain that there remains considerable potential for the discovery of large valuable deposits in the future in areas, which have not been extensively explored yet.

New technology enhanced the optimising of reserves. Exploration by various mining houses was ongoing as part of their annual commitment to secure adequate reserves for optimisation of their huge capital investments (DME, South Africa's Mineral Industry, 2004/2005:6).

### **1.2.6.2 Mineral resources**

At present the South African mining industry controls, in some respects, the largest deposits of minerals in the world (refer table 1.2). The country holds the world's largest ore reserves of the platinum-group-metals (87.7 per cent), manganese (80 per cent), chromium (72.4 per cent), gold (40.1 per cent) and vanadium (31.0 per cent). It also holds significant reserves of titanium minerals, zirconium, vermiculite and fluorspar ore (COM, Facts & figures 2006:8). Substantial quantities of minerals and metals occur in coastal dune sands. These minerals and metals were being economically exploited at Richards Bay and Namakwa Sands (Wilson & Anhaeusser, 1998:1-4).

### **1.2.6.3 Production**

The South African mining industry produced over 38 per cent of the world production in chrome ore, ferrochromium, platinum-group metals, vanadium and vermiculite (refer table 1.2). It is the leading world producer of alumina-silicate (36.4 per cent), chrome ore (38.7 per cent), ferrochromium (40.5 per cent), gold (11.7 per cent), pgms (56.7 per cent), vanadium (48.0 per cent) and vermiculite (39.6 per cent). In 2006 it produced substantial quantities of manganese, titanium and fluorspar minerals (COM, Facts & figures, 2006:8).

### **1.2.6.4 Export**

The South African mining industry is one of the largest exporters of minerals in the world (refer table 1.2). In 2006 it exported 34.4 per cent alumina-silicate and 50.9 per cent ferrochromium to the world markets. It also exported substantial quantities of aluminium, chrome ore, coal, ferro-alloys of manganese, ferrosilicon, iron ore, manganese and silicon metal (COM, Facts and figures, 2006:8).

It mined over 60 different types of minerals of which the vast majority were exported to more than 100 countries in the world (COM, Annual Report, 2004 - 2005:14). Because the domestic markets are rather limited the majority of the country's mineral products are exported.

## **1.2.7 Role of the mining industry in the South African economy**

### **1.2.7.1 Role in the development of the economy**

The exploitation of minerals gave impetus to the development of South and Southern Africa as a region. The urban centres that grew around the mining industries created domestic markets that encouraged the growth of other secondary industries such as transportation systems and water and



electrical energy reticulation systems. Secondary and service industries grew and matured on the back of these demands (DME, South Africa's Mineral industry, 2002/2003:1).

The industry played a major role in the economic and social development of the country (refer section 1.2.7.2). It remains, through its major representative institution, the Chamber of Mines, founded in 1889, one of the leaders in worldwide policy setting of mining standards and research, job creation, employment, training and development of employees (DME, South Africa's Mineral Industry, 2004/2005:2).

The industry was and still is a major contributor to the upliftment and empowerment of previously disadvantaged communities of this country and to a large extent to the countries to the North. It still is playing a major role in the general economy in the country (COM, Annual Report, 2004 - 2005:14-63). The industry has developed specific unique engineering and mining abilities over the decades that were and still are very much sought after by many countries in the world. It is still extremely viable, vibrant, progressively focused and uniquely positioned to face and successfully overcome the current and future challenges that certainly would be facing the mining people of the future (COM, Annual Report, 2004 - 2005:15).

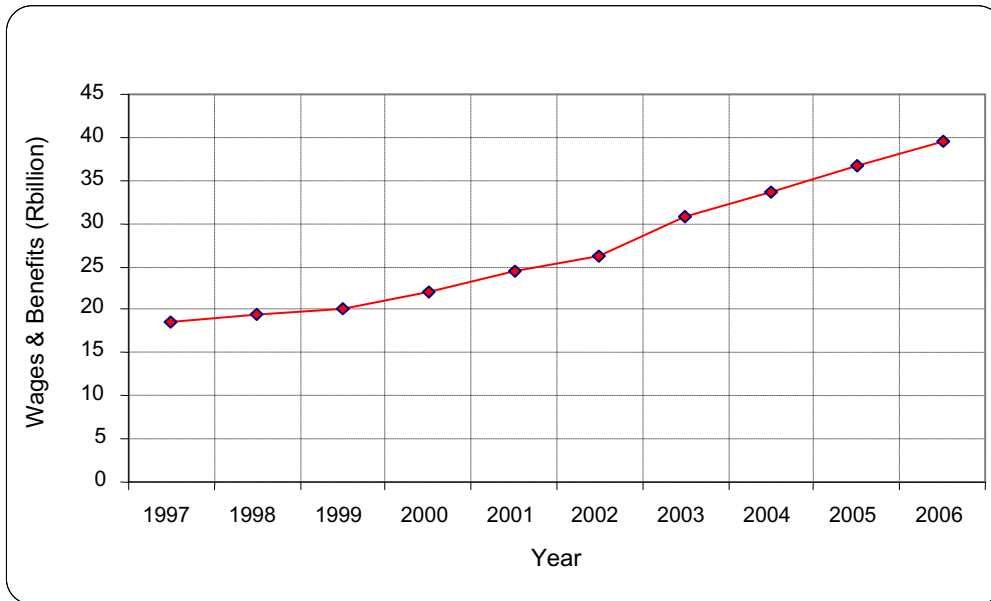
#### **1.2.7.2 Contribution of mining to the national wealth**

The Chamber of Mines of South Africa reported in its 2004 annual report that the mining industry, mainly supported by gold, coal, platinum and diamond production, had since its inception made an extremely important contribution to the national economy of South Africa (COM, Annual Report, 2004 - 2005:14). The Department: Minerals and Energy of South Africa supported this view when stating that the industry provided the stimulus for the extensive development of an efficient physical infrastructure and that it contributed in no small measures to the development of related secondary industries in the country (DME, South Africa's Mineral Industry, 2002/2003:1).

The Chamber of Mines (COM, Annual Report, 2006 - 2007:12) reported that in 2006 the industry:

- a) accounted directly for 7.0 per cent of South Africa's gross domestic product (GDP),
- b) directly accounted for 6.5 per cent of the total fixed investment and for 9.1 per cent of the total private sector investment versus 6.3 and 8.7 per cent respectively in 2005,
- c) continues to act as a magnet for investment in South Africa,
- d) contributed R140 billion to South Africa's exports,
- e) concluded R24 billion worth of empowerment deals. Over the past 11 years a total of R91- billion worth of empowerment deals had been concluded in this resources sector,
- f) moved about 100 million tons of bulk commodity ores for export on the rail system,
- g) accounted for 6.3 per cent of those employees employed in the non-agricultural formal sector of the economy and 8.1 per cent of the total private sector of non-agricultural employment in 2006,
- h) paid R40 billion in wages and benefits to employees which accounted for 5.4 per cent of the total compensation to all employed in the country in 2006,
- i) paid R16.2 billion in direct taxes and a major portion of indirect taxes to the fiscus in 2006,

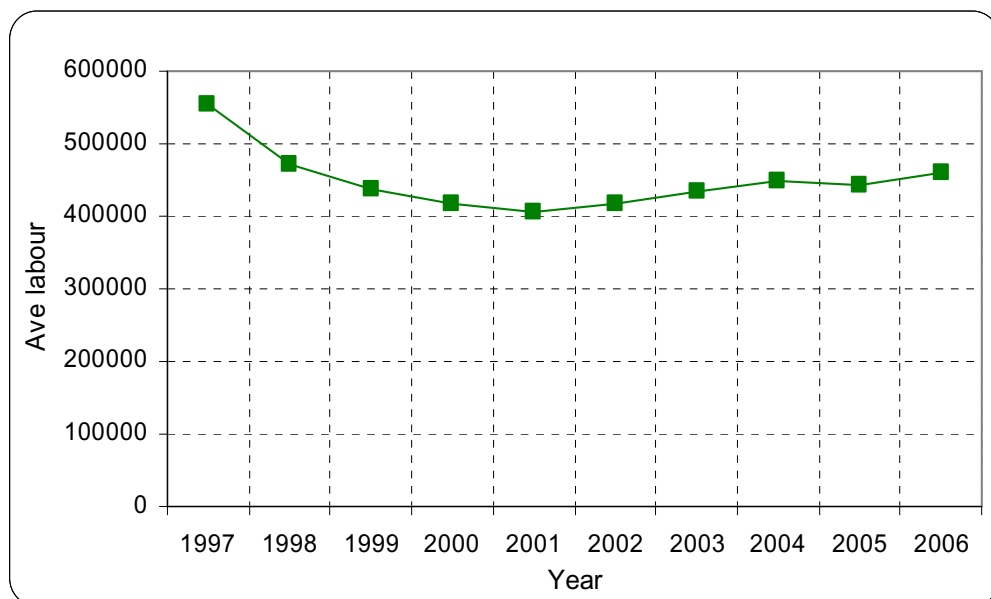
j) supplied through its coal mining sector 110 million tons of coal for the generation of electricity and 41.1 million tons of coal for liquid fuel production,



**Figure 1.7: Total earnings – all mines**

Source: DME, Mineral Statistical Tables (1985 - 2006:21)

- k) was the world’s largest producer of platinum group metals (pgms), gold, chromium, ferrochrome, vanadium, manganese and vermiculite,
- l) accounted for a substantial amount of the supply and demand for energy. The industry consumed 15.3 per cent of Eskom’s local electricity sales, and
- m) directly employed an average of 458 600 workers in 2006, against 444 132 in 2005.



**Figure 1.8: Average labour – all mines**

Source: DME Minerals Statistical Tables (1985 – 2006:21)

The industry was also responsible for considerable infrastructure development, for example 3 000 km of railway line, three ports and a large amount of bulk handling infrastructure at other ports could mainly be attributed to the industry. It is making a considerable contribution to the development and maintenance of social infrastructure such as clinics, schools and other social facilities (COM Annual Report. 2004 - 2005:14).

### **1.2.8 The mining environment**

All organisations operate within an environment in which specific role players or stakeholders have certain vested interests and which must be identified, respected and taken into consideration by the specific organisations. Carroll and Buchholtz (2000:65) defined stakeholders as individuals or groups that have interests or stakes in the organisation. Just as stakeholders are affected by the decisions of the organisations, organisations are affected by decisions of the stakeholders.

Mining organisations operate within specific internal and external environments with inherent risks that can change and may adversely affect the performance of the organisation. Ignorance of these factors can have disastrous effects on the performance and future survival of organisations and the employees, communities and secondary industries involved with it. All the employees on all the levels of the organisation should be able to timeously identify and manage the risks within their areas of accountability (COM, Annual Report, 2004 - 2005:42-48).

#### **1.2.8.1 The internal environment**

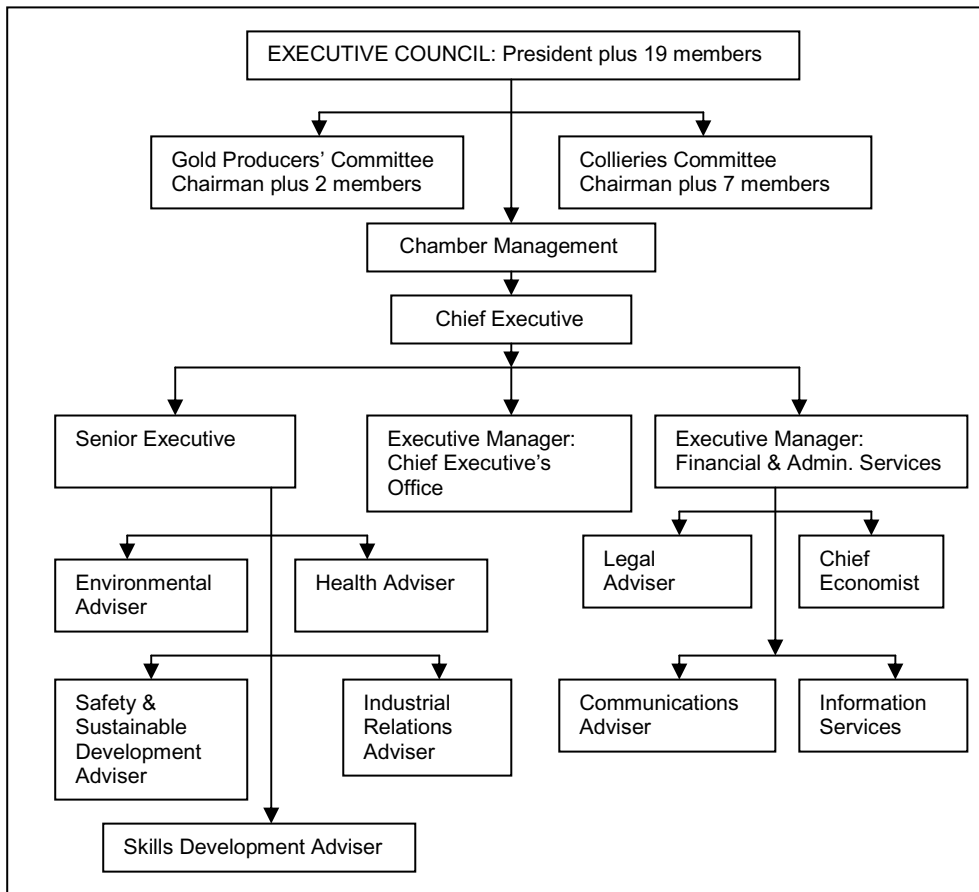
##### **a) Main regulating bodies**

The two main regulating bodies in the South African minerals industry are the Chamber of Mines of South Africa and the Department: Minerals and Energy, a governmental institution. The Chamber was founded in 1889. It is a voluntary, private sector employer's organisation.

The COM main aims are to nurture relationships with its stakeholders and to promote the interests of the South African mining industry (COM, Annual Report, 2006 - 2007:7). It is an association of mining companies operating in the gold, coal, platinum, diamond, manganese, copper, iron ore, zinc, lead and antimony mining sectors. It acts as the principal for the relevant mining employers (refer figure 1.9).

It represents the formal views of the members to the:

- various relevant opinion-forming and policy-making entities inside and outside the country,
- departments of South Africa's national and provincial governments (DME, South Africa's Mineral Industry, 2004/2005:2),
- various labour unions during the annual wage negotiations,
- unions during the determination of the conditions of employment, and
- communities during the establishment of future community projects.



**Figure 1.9: Management structure of the Chamber of Mines**

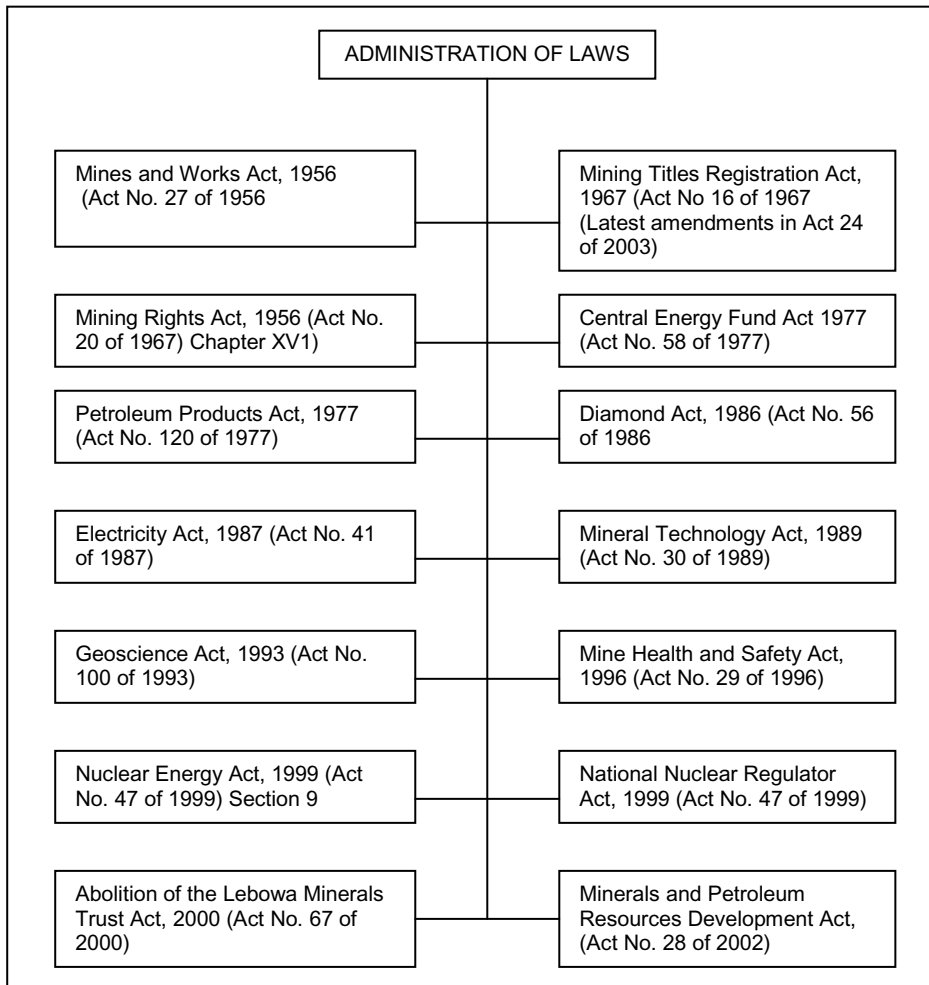
Source: COM Annual Report (2006-2007:1)

The Department of Minerals and Energy is a governmental body, which represents the government's involvement in the mineral sector. Its main objectives are to:

- provide and maintain appropriate legal and fiscal environments to facilitate unimpeded exploration for mining, beneficiation and marketing of minerals in the country,
- provide and maintain efficient physical infrastructures such as roads, rail, air and harbour facilities, communications and health services, and electricity and water supplies, and
- control acceptable mining practices and optimum utilisation of available reserve deposits.

The DME is responsible for the administration of the Minerals and Petroleum Resources Act, 28 of 2002, which came into effect on the 1st of May 2002 (DME, 2004/2005:3). The Mine Health and Safety Inspectorate advocate the safe and responsible mining of minerals under healthy conditions. It is represented in the various provinces by Principal Inspectors. The Energy branch promotes the optimum and sustainable utilisation of energy resources by all operators.

The Minerals Development Branch (MDB) promotes the orderly and optimal mining and utilisation of mineral resources and is represented in the provinces by Regional Directors. The Council for Geoscience is responsible for geological mapping in respect of the identification, location, extent and nature of ore bodies. It also maintains a national data basis of the country's geoscientific data and information.



**Figure 1.10: Summary of South Africa’s Administration of Mineral and Mining Laws**

Source: DME, South Africa’s Mineral Industry (2004/2005:4)

Both the COM and the DME are instrumental in the endeavours to maintain acceptable health and safety performances in the mining industry. Each maintains a specific dedicated department responsible for the achievement and maintenance of their health and safety objectives (refer figures 1.9 and 1.10). All mining practices that could in any way have potential safety risks would have to be scrutinised and approved before it could be implemented. The roof bolt support procedure in collieries for example needs to be approved by the responsible principal inspector.

**b) Legislation**

The Mineral and Petroleum Resources Development Act (MPRDA) was approved and brought into effect on 1st May 2004. The industry declared itself supportive of the requirements of the introduced acts. It supports, through the Chamber of Mines, the sovereignty of the state over the mineral resources of the country, the expansion of opportunities to previously historical disadvantaged communities, the promotion of economic growth and mineral development and to provide employment, social and economic welfare as well as ecologically sustainable development (COM, Annual Report, 2003 - 2004:9).

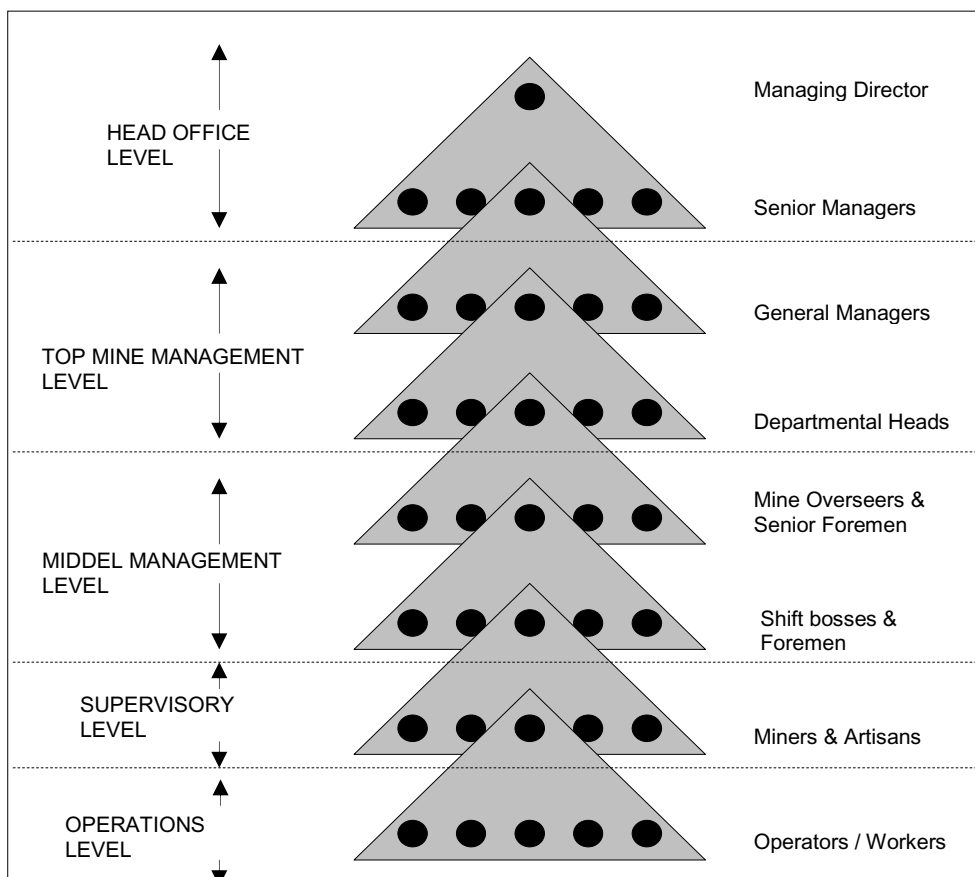
**c) Geological conditions**

One of the most important and largely unpredictable factors to the operation and safety and health of the industry was the geological conditions. Each mineral sector is subjected to specific geological conditions peculiar to it that can sometimes result in conditions that could have serious consequences to the safety of employees, production performance and the viability of mines. Geological conditions can vary from mine to mine, area to area and within a specific mineral deposit being exploited. The conditions could change rapidly and unexpectedly which could result in the collapsing of the immediate environment and strata that could adversely affect the safety, productivity and output.

All the employees, particularly those employed in the dangerous underground conditions should be adequately trained to timeously identify and correct high risk factors. They have to take the necessary decisions in action in order to ensure safe performance.

**d) Management and subordinate interaction**

The organisational structure of a mine consists of different vertical and horizontal levels (refer figure 1.11). It is imperative that employees recognise and respect the relative organisational positions of these levels in the general management activities.



**Figure 1.11: A typical simplified mining house organisational structure**

The mining houses developed, since their inception, typical traditional organisational structures. Existing structures were largely steep autocratic type structures and are to some extent still legacies of the autocratic leadership culture from the late nineteenth hundreds (refer figure 1.11). These structures were not developed from a scientific management logic. Mainly due to escalating increases in labour cost and the resulting pressure on cost control numerous exercises to cut labour almost at random were introduced. The resultant cost reductions were not necessarily the optimal long-term solutions.

For sound management and performance various necessary interactions between managers, subordinates, peers, supervisors and all other stakeholders must occur as the needs arise. Employees need to interact efficiently in order to affect proper integration, coordination of tasks and relations when determining or planning the most probable achievable results, responsibilities, reporting lines, performance standards and the control measures applicable to the specific situation.

The interaction between the employees in the organisation horizontally, vertically and across is a management aspect which, up to now, had not been addressed adequately (refer section 1.2.8.1 (a)). It is an activity, which is an absolute necessity for the efficient coordination and integration of tasks and the realisation of objectives in any organisation. It is imperative for efficient communication, reporting and supervision right through the organisation. The responsibility of management to ensure that the results required should be achieved can not be delegated or wished away in any organisation. The results of the organisation is the sum total of all the results of all employees. The organisation is the vehicle with which to optimally realise the organisation's objectives.

Stoner (1982:9) argued that organisations should:

“enable us to reach goals that would otherwise be much more difficult or even impossible to reach.”

It follows that each employee has a specific role in the realisation of an objective that should support the objective of the section, department and the main objective of the organisation as a whole (refer section 5.3.12.4 and figure 5.7). Effective interaction between the employees, supervisors, peers and subordinates are indispensable. An efficient management method would ensure that effective structures and communication channels to facilitate this requirement are designed, instituted and maintained at all times.

#### **e) Organised labour**

Organised labour in the mining industry had come to stay. Legally it has specific entrenched rights, which must be recognised and respected by management. The unions, through their representative bodies, are definite stakeholders within the mining environment. Management must recognise these rights. It must cooperate and assist the unions with the necessary facilities and procedures to exercise their rights in an efficient and responsible manner. The industry should never abdicate its

professional right to manage and execute the duties associated with it. On the other hand unions have certain bargaining powers, which should be responsibly and productively utilised by the industry (COM, Annual Report, 2004 - 2005:61).

#### **f) Customers**

Customers are contractually entitled to agreed-upon services in time in the right quantities and qualities at the agreed costs. Continued excellent service at all times is imperative. Satisfied customers would tend to support the industry and even expand future business. Customer care is a very important aspect of the industry especially in the export business. The mining industry built over many years an exclusive customer base. It has to serve these customers in a way that would retain and increase their support for as long as possible.

Black and Porter (2000:73) emphasised that customers have specific powers and in a fierce competitive market have more power to negotiate lower commodity prices. The industry experienced with the increased global markets, that these markets were by no means a given. Lower prices had come to be one of the main bargaining issues. This means that the industry must at all times strive for lower production costs that could best be maintained with optimal management practices.

#### **g) Immediate communities**

According to Black and Porter (2000:76) any business has to operate in harmony with the communities within which it exists and abide by mutual agreements. There is no doubt that industries have definite obligations towards the societies in which they perform their business in addition to the owners and customers they serve (DuBrin, 1994:38). It should participate in activities of mutual interest and where practically possible, support and promote community interests (Bruning & Ledingham, 2000:159). The mining industry had historically been and still is involved in the provision of social services and infrastructure such as roads, schools and clinics to communities (COM, Annual Report, 2004 - 2005:14). The industry should maintain a sound relationship between itself and the communities (Crane et al, 2008:61).

### **1.2.8.2 The external environment**

#### **a) Globalisation**

The world became a global village and organisations can no longer escape the influences of the global environment (Amey, 1986:54). It must face the reality of global involvement and competition. With an increasingly competitive global market the optimal utilisation of all the resources of the industry becomes vital. Economic globalisation required development in trade, finance and direct foreign investment by multinational corporations (Gilpin, 2001:5 & Mshonda, 2000:16).



## **b) Competition**

Topping (2002:27) argued that it would be difficult to find an industry today that is not experiencing fierce competition. One of the first aspects that industries should determine is the nature and magnitude of competition (Black & Porter, 2000:71). According to Malecki (Ajami and Bear, 2007:19) competition and economic development today is extremely difficult to predict and control. Business should therefore develop more effective research and forecasting techniques.

## **c) Suppliers**

Black and Porter (2000:73) argued that every business has specific suppliers some of whom can, by increasing their prices, adversely affect the profit position and survival of the business. In order to optimise its performance mine management needs to maintain close contact with existing and potential suppliers of consumables, equipment and specialised services. The industry can contribute considerably to the identification and development of equipment and consumables that could result in improved performance and the containment of costs. Suppliers on the other hand have to create and maintain sound relations with the mining industry in order to be in a position to identify the existing and potential needs of the industry.

## **d) Shareholders**

Shareholders supplied the capital and are therefore entitled to an acceptable return on their investments. The more the investors trust the industry and the country the more investments would be attracted to the industry. Increased investments would result in the expansion of the industry with the resultant increasing of job opportunities, stability and prosperity of communities.

## **1.2.9 Challenges facing the mining industry**

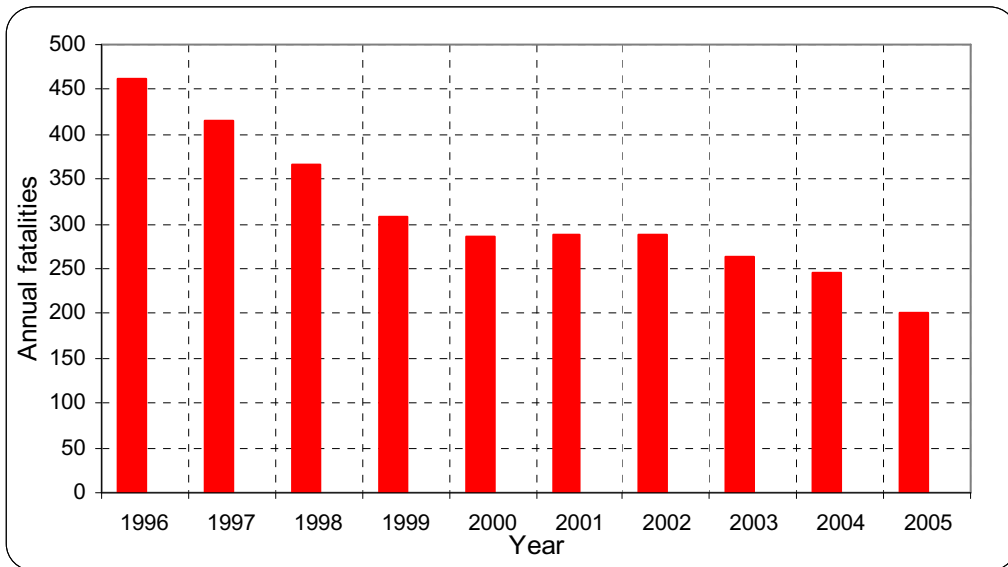
### **1.2.9.1 Health and safety**

Mining is characterised by a relatively high accident rate (Lucas, 1969:4). The total number of fatal accidents for the South African mining industry decreased from 463 in 1994 to 202 in 2005 (refer figure 1.12). Rice (Edgecombe, 1998:202) of the United States Bureau of Mines advised the Natal collieries in 1928 to concentrate on the implementation of proper management principles, especially planning and controlling in order to improve safety. In order to stay with international thinking and practices on safety, the mining industry often employs international consultants for assistance and advice (Tempelhoff & Le Roux, 2004:2). The different mining groups also benchmarked themselves against the most successful mining industries in safety.

The industry had its 'fair share' of catastrophes. Some of the major incidents were:

- a) The big explosion in October 1926 at the Durban Navigation Colliery (DNC) in Natal where 125 mineworkers were killed (Hocking, 1995:202).

- b) A total of 437 men died in 1960 underground in the Coal Brook Colliery Disaster. This tragedy triggered intensive investigations into the design and stabilising of underground support methods and specifically in the coal-mining sector (Lang, 1995:140).
- c) On 12 September 1983, a total of 63 mineworkers were killed in a coal dust explosion in the Hlobane Colliery in Natal (Edgecombe, 1998:218-219), and
- d) In September 1986 a total of 177 mineworkers succumbed in the Kinross disaster (Jones, 1986:211).



**Figure 1.12: Total fatalities – all sectors**

Source: COM, Facts and figures (2004:10) & DME Annual Report (2005 – 2006:16)

The mining industry is continuously striving to reduce the number of accidents. Researches were initiated resulting in more safe, healthier and productive mining methods. Since 2003 the industry is benchmarking itself against the safety performances of the main leading mining industries in the world: Australia, the United States of America and Canada. From this benchmarking drive it would appear that the percentage improvement required to meet the international benchmarks was showing improvements on a year-to-year basis with the exception of the gold, iron ore, limestone and the clay sectors. (COM of South Africa, OHS & SPC circular No. 42/06:5).

All possible practical affordable means are being made and employed to control, combat and eliminate diseases such as silicosis, HIV/AIDS, noise and occupational related diseases. The necessary conditions and practices conducive to promoting improved health need to be developed when and where necessary and maintained by the industry through the specific groups and individual mines (COM, Annual Report, 2004 - 2005:49-54).

Pienaar (2005:6) reported that 47 per cent of all deaths in South Africa for 2005 could be attributed to HIV/AIDS. Sunter (1996:35) warned that HIV/AIDS could overturn the demographic projections with devastating effects on the availability of labour, astronomical health and welfare costs, disrupting effects on families and productivity (COM, Annual Report, 2004 - 2005:52). According to

van Biljon (Sake-Rapport, May 4, 2008:3) too many workers are still being killed in the South African mines. Efforts to improve safety in the South African mining industry are continuing. The author is of the opinion that existing management practices are inadequate to supply the necessary management proficiency to further significantly improve on the overall performance in the industry. A comprehensive, practical and integrated management method is required that would enable each employee to deliver the results required from him safely and economically.

#### **1.2.9.2 Containment of input costs**

The industry, similar to all other business sectors, was and still is subjected to spiralling price increases of consumables, labour costs and government levies to name only a few. Many countries worldwide are today experiencing socially destructive inflation, misuse of economic resources and high unemployment rates (Friedman, 2007:3). Since many of the mining products are largely dependent on the R/\$ exchange rate, any negative movement in this ratio would negatively affect the profit position and survival of the industry (DME, South Africa's Mineral Industry, 2004/2005:49). The appreciation in the R/\$ exchange rate in 2003 for example resulted in a decrease of R20 billion in the South African mineral sales (COM, Annual Report 2004 - 2005:18).

In the recent past the cost pressures from domestic suppliers rose faster than inflation. The results were that most of the export sector was adversely affected by this trend. Many industries providing goods to export sectors are mainly monopolistic providers with little flexibility or price competitiveness. The result was that the price increases of these industries have generally risen faster than inflation (COM, Annual Report, 2004 - 2005:31).

#### **1.2.9.3 Managing union demands**

Mass action by unions, sometimes misused by political activists as pressure groups, can be disastrous to the optimisation of the results of mining companies (refer section 1.2.8.1 (e)). Stadler (1997:49) mentioned that during the 1980s political groups used unions to exert excessive pressure on the government of that time. Management practices should enhance responsible participation, involvement and commitment by the union and association members. It should give them a better insight into the operation of the company and the importance of their contribution to creating better performance results and increasing job security. It could be more likely then that the unions and worker associations would, as a result, be less inclined to withhold their labour unreasonably over issues that could negatively affect the company and their future.

#### **1.2.9.4 Provision of sufficient competent labour**

##### **a) Cost of labour**

The cost of labour, on a unit basis, for most mining companies became the greatest percentage of the unit cost of their products. This trend is increasing annually at an alarming and seemingly

uncontainable rate. It resulted in frequent labour retrenchments and even closures of parts or of whole mining operations in the past. Containment of the labour cost became one of the most urgent priorities in the management of the industry. For the period 1997 to 2006 the labour in the industry decreased by 17.1 per cent in numbers whilst the average salaries in real terms increased by 156.2 per cent per employee (refer table 1.3 & 1.4). It is interesting to note that the salaries have increased at a rate far in excess of the rate of labour reduction or rationalisation.

Year	Annual wages per worker R (in real terms)
1997	33 702
1998	41 130
1999	45 942
2000	52 994
2001	59 874
2002	63 051
2003	70 765
2004	74 973
2005	82 595
2006	86 346

**Table 1.3: Wages in South Africa's mining industry (1997 – 2006)**

Source: DME, Minerals Statistical Tables (1985 - 2006:21)

Flamholtz (1985:61) pointed out that human resource costs must be referred to as the costs incurred to acquire or replace people. It includes the total costs of advertising, employment, training and development and remuneration. Kerzner (1997:1) stated that in the past executives attempted to ease the impact of cost increases by embarking on massive cost-reduction programs. These practices, unless carefully planned, can result in some necessary tasks not being performed with disastrous consequences on the longer-term performance and survival of the organisation.

#### **b) Employment.**

One of the most popular solutions in practice to reduce and contain the labour cost increases was to introduce more capital intensive and technologically advanced methods. The resulting labour reduction increased the rate of unemployment, poverty, crime and the potential for civil unrest and anarchy. Unacceptably high unemployment rates would increase the social and political burden on a community and country. It invariably would lead to increases in social assistance and support from the state.

Baily and Okun (1982:144) argued that one of the prime responsibilities of any government is to promote maximum employment, production and purchasing power. Many governments fail to realise this objective. Visser (2005:21) commented that according to the 2004 national census the unemployment rate in the Republic of South Africa, as calculated by Statistics South Africa (SSA),

was 26.2 per cent. It represented a total of approximately 4.13 million people unemployed, out of a total of 15.8 million economically active people.

Year	Average number of employees in service			Earnings (R1 000)		
	Total	Males	Females	Total	Males	Females
1997	553 442	540 494	13 048	18 665 685	18 108 705	546 980
1998	471 832	459 829	12 003	19 406 377	18 822 867	583 510
1999	436 472	425 745	10 727	20 052 453	19 440 078	612 375
2000	417 559	407 183	10 376	22 128 314	21 428 573	699 741
2001	406 994	396 440	10 554	24 368 519	23 622 644	745 874
2002	415 988	404 543	11 445	26 228 418	25 356 228	872 190
2003	435 628	422 983	12 645	30 827 356	29 691 472	1 135 884
2004	448 909	435 152	13 757	33 655 942	32 328 754	1 327 187
2005	444 132	428 579	15 553	36 682 979	35 083 026	1 599 952
2006	458 600	439 906	18 694	39 598 234	37 626 787	1 971 447

**Table 1.4: Labour Statistics – All Mines**

Source: DME, Minerals Statistical Tables (1985 - 2006:21)

A growth rate of above 6 per cent per annum was suggested by the government to successfully solve the existing and expected future unemployment and poverty rates. The mining industry accepted this challenge (COM, Annual Report, 2004 - 2005:29). The industry's actual growth rate of 4.2 per cent for 2004 was still significantly lower than the government's growth target. The problem of high unemployment was seriously aggravated by the uncontrollable influx of illegal immigrants, mainly from the northern African countries.

### c) Empowerment of employees.

The broad-based socio-economic Empowerment Charter for the South African mining industry, promulgated in May 2004, stipulated that historically disadvantaged South Africans should control 15 and 26 per cent of the mineral industry within 5 and 10 years respectively (DME, South Africa's Mineral Industry, 2004/2005:2). In the work situation the Equal Employment Act regulates empowerment.

Care should be exercised that this policy does not result in the lowering of work standards and performance. The danger of such an event can not be emphasised strongly enough. Normally employees should not be promoted unless they have acquired the necessary competency. Fritz (2001:15) stated that managers should allow subordinates only to function within the limits of their competency and delegated authority by agreement. Kouzes and Posner (2002:279) indicated that it is most important to recognise that each employee has a specific area of responsibility and has the right, provided that he is competent, to take the decisions related to his work.

When an employee is appointed in a position in which he is not adequately competent he would not be able to deliver optimal results and would contribute to the lowering of standards, supervision and

control with the resulting negative impact on company results and competitiveness. This practice could eventually result in the closure of parts of the organisation or even the whole organisation.

#### **d) Provision of skills**

With the present government's emphasis on affirmative action and the imposition of the Equal Employment Act many white South Africans are leaving the country. The resultant skills drain and shortage poses a serious threat to industrial development, particularly in the mining industry and is seriously eroding the investors' trust in the future of the country. Employees should be adequately trained, developed and coached in the work situation. Caring for employees should be at the heart of anyone's coaching philosophy (Topping, 2002:97).

According to Professor Richard Stacey of the University of the Witwatersrand, engineering department, the lack of skills in the mining sector poses a serious threat and risk (Mining Mirror, January 2004, volume 16 No 7:15). Over the past few years the industry financed the development of key skills through mining bursary financial schemes to the amount of R60 million per annum. The industry contributed financially to attracting and retaining quality teaching staff at South African universities (COM Annual Report, 2004:121). Hartog and Van den Brink (2007:54) proved that individuals with more education perform better than individuals with less education. Many of these graduates would one day become leaders in their specific area of expertise of the industry. Charan (2008:8) emphasised that the development of strong leadership would be vital for the future success of the company.

#### **1.2.9.5 Responsible environmental management**

The MPRDA introduced drastic measures in order to rectify the past abuses by mining companies in respect of environmental rehabilitation (refer section 1.2.8.1 (b) and figure 1.10). It laid down specific procedures for orderly and acceptable future environmental management. Mine closures now demand an extremely high priority from both the government and the mining organisations. In essence it entails the planning and financial provision for the closure as part of the planning of the establishment and operating costs of a mine (COM, Annual Report, 2003 - 2004:91).

#### **1.2.9.6 Compliance with legal and statutory requirements**

The state's influence within the mineral industry is limited. It aims to support and promote equal opportunity and access to the exploitation of minerals by all citizens, to provide and maintain a legal and fiscal environment facilitating unimpeded exploration and mining, beneficiation and marketing of minerals and an efficient infrastructure (DME, South Africa's Mineral industry, 2004/2005:3).

Whilst the state acts as guardian over the exploitation of minerals it should itself refrain from the temptation to get overly restrictive and involved with the practical exploitation. Initiatives by the

government, for example, should be well contemplated in order to maintain investors' trust and support (Kayizzi-Mugerwa, 2003:228).

#### **1.2.9.7 Managing comprehensively.**

Organisations operate today in an era where taking on the risks of leadership became more important and complicated than ever before (Heifetz & Linsky, 2002:4). The South African mining industry's prime position for years as being a competitive and relative cheap supplier of minerals to the world markets is becoming under attack lately. It experienced a bad 2004-year in terms of commodity costs and profits (De Lange, 2005:21).

The reasons for this substandard performance were many. Van Biljon (2005:10) commented that the reason for the unacceptable performance can to a large extent be attributed to the fluctuating R/\$ exchange rate. According to Sunter (1996:91) the key uncertainties in the industry revolved around the question of whether the world would move smoothly towards a frictionless international trading system or whether nationalisation and protectionism will get in the way. Drucker (1992:15) warned against the inherent dangers of protectionism to any industry. It is perceived that existing management literature does not provide the employee with the necessary managerial 'tools' to manage his work comprehensively in the practical situation. As a result the industry can not plan and manage for optimal performance.

#### **1.2.10 Management practices in the South African mining industry**

##### **1.2.10.1 Introduction of the management discipline in the mining industry**

The South African mining industry was largely founded, financed and developed by financiers, from German and British stock. Of the initial leading 25 entrepreneurs, 15 were Jewish mainly from Germany and Austria (Jones, 1995:5). It was then the era where the systematic and bureaucratic management approaches were the main recognised management practices in Europe and America (refer section 2.5.1.1 (a) and 2.5.1.1 (c)).

It could be assumed that either one or a combination of these approaches were automatically applied by some or all of these captains of the original mining industry and as a result became the predominant management practice in the specific company and ultimately the group. As new management approaches, such as the scientific and administrative management approaches entered the industrial scene they were most probably evaluated and implemented according to personal preferences (refer section 2.5.1.1 (b) and 2.5.1.1 (d)).

According to Holl (Association of Mine Managers of South Africa, Papers and Discussions, 1958 - 1959:805-834), when delivering a paper to the Association of Mine Managers of South Africa, training in the South African mining industry followed basically the same pattern than that in the rest of the world industry. In South Africa the Government Miner's Training School (GMTS), to



specifically train miners, was founded in June 1911. Since then technical training had gradually been extended to all unskilled and technical employees.

Supervisory training in the skills to perform accurate and regular control of technical work completed or in progress according to specific developed procedures or instructions as called by the industry, had become a speciality in mainly the gold mining industry. Work-study techniques, initially developed by Taylor with his scientific management approach, became popular and were extensively utilised in the mining industry to compile detailed standard instructions. These standard instructions were used to train the workers and supervisory personnel to efficiently perform and control the work completed and in progress on a daily basis.

Holl (Association of Mine Managers of South Africa, Papers and Discussions, 1958 - 1959:836) pointed out that human relations and training are complementary. Training increases knowledge, skills, and competencies and improved understanding of the needs of other workers and the company as a whole.

Management training in the mining industry was officially introduced in 1953. The first management course consisted of the four management fundamentals of planning, coordination, controlling and motivation. Since then training in the various aspects of management had been introduced right through the mining industry. Although it was a major step in the development of especially managers it was still considered as being far from adequate. According to Vermooten (Association of Mine Managers of South Africa, Papers and Discussions, 1958 - 1959:842) the lack of adequate managerial skills would pose a serious problem in future.

He commented that:

“A need which has been very difficult to meet in the past is that of training senior executives in the skills of management. Educational institutions provide facilities for technical training but hardly any for the training of potential managers in the art of management.”

In order to improve operational performance and promote safety in the industry the Mine Manager's Certificate of Competency (MMCoC) was introduced in 1956. It was made compulsory by the Department of Mining as a legally required qualification for a person to be competent to be appointed to manage a mine, part of it or works (Hocking, 1999:207). The management part of the syllabus was based on the administrative management approach (The South African College of Mining). This certificate is still valid and a requirement for the appointment of a manager on a mine, whether in a junior or senior position. At this stage it would appear that the majority of the legally appointed managers are holders of this qualification only.

The industry used and is still making use from time to time of single topic management practices that came and are still periodically coming on the market (refer section 4.2.2 and 4.2.3). The administrative management approach, consisting of the main management functions of planning,



organising, leading and controlling, appears to be the most widely accepted and utilised approach in the South African mining industry to date (refer section 4.2.3.1 and 4.3.2). From discussions with top executives of most of the largest mining houses it would appear that the management part of the Mine Managers Certificate of Competency does not equip managers with adequate theoretical knowledge in order to perform their work efficiently (refer section 3.8.1). They expressed their concern and suggested that a comprehensive and integrated management method be introduced.

### **1.2.10.2 Management styles in the South African mining industry**

Initially the management styles in the industry were strictly autocratic and militaristic, legacies of which are even still prevalent today in some groups. The autocratic style was partly as a result of the legacies of the bureaucratic management approach: the general prevailing concept of 'boss and worker' at the time and the strict supervisory procedures and standard instructions implemented and maintained by the industry to promote safety and productivity (refer section 2.5.1.1 c).

Because of the inherent dangers associated with mining, especially deep mining, tolerance with sub-standard performance could not be tolerated. Extensive use was made of mainly the scientific management approach in order to compile detailed operating methods, generally labelled as 'standard instructions' for the training of all workers and supervisory personnel to efficiently perform and control work completed or being performed. The management styles in the mining industry have kept pace with that of other industries and became much more accommodative in recent years. Holl perhaps best expressed the sentiment and attitude of management in this regard (Association of Mine Managers of South Africa, Papers and Discussions, 1958 - 1959:811).

He concluded that:

"I think it is correct to say that in doing any item of work one can do it so badly that it becomes uneconomic by virtue of the fact that it becomes completely useless for the intended purpose or the waste of effort and material renders it prohibitive from a point of view of costs. Similarly, on the other hand, an item of work completed to an absolutely useless degree of accuracy is bound to become equally uneconomic. The balance lies in the correct degree of accuracy enforced."

### **1.2.10.3 Perceived deficiencies of existing management methods**

Haines (1999:12) argued that for optimal results the management work for the whole organisation needs to be performed comprehensively by all the employees on all the levels of the organisation at all times in a coordinated and integrated manner so as to optimally support the realisation of the objectives of the organisation. From this it follows that a comprehensive, practical and integrated management method would enable all the employees on all the levels of the organisation to efficiently plan, implement and control the work necessary to be performed in order to realise their objectives in the most efficient manner.

The industry, traditionally, was inclined to view the setting of safety performance standards and the achievement of safety results as separate from the normal planned production performance results (refer section 4.2.2 and 4.2.3). It should, however, be outcomes of the same production process or system and must be part of the total planning of the organisation and should not be planned and managed separately.

The perceived management deficiencies in the mining industry appear to be that:

- a) existing management practices lack the necessary theory and relevant implementation procedures which would enable employees to manage in a comprehensive, practical and integrated manner on all the levels of the organisation,
- b) a logical comprehensive, practical and integrated planning process and structure does not exist,
- c) the classification, integration and coordination of the management functions, activities and the levels of planning into one comprehensive system can not be performed efficiently at present,
- d) the many available management practices being utilised by the industry do not, even as a combination, provide management with the necessary managerial 'tools' to efficiently manage the complex mining operations on all organisational levels, and
- e) the many different programs utilised, sometimes simultaneously on a mine and sometimes without the knowledge or involvement of all departments, could cause more harm than good.

### **1.3 THE RESEARCH PROBLEM**

Field researches by the author into the efficiency of existing management practices and the degree of managerial competency of employees, on all the levels of a number of mining organisations proved that suitable practices for comprehensive, practical and integrated management did not exist. Employees appeared to be unable to efficiently plan their management work and to scientifically design and develop the necessary organisational structures.

The literature cited in this thesis and the academic reading associated with management practices and related management courses, seminars and workshops attended by the author over a period of more than 30-years in managerial positions did not reveal a single reference where existing management practices specifically addressed the development of comprehensive management practices. The theory and relevant implementation procedure for a comprehensive, practical and integrated management method that would solve all the managerial deficiencies identified in section 1.2.10.3 could not be ascertained. The problem was further emphasised by comments of several distinguished world-renowned management authors. Drucker one of the most renowned management thinkers over the past 60 years and labelled by the Harvard Business School as 'The pre-eminent management thinker of our time' is well known for his frank sentiments in this regard.

Drucker (1968:41) stated that:

"But what it is to manage a business, what it requires, what management is supposed to do and how it should be doing it, have so far been neglected."

Drucker was always interested and concerned with the work that management was supposed to do. He did not pay equal attention to the producers of the results – the workers. Consequently the emphasis on the basic management truth that results are and must be delivered by all the employees jointly as a team in the organisation was not really put into proper perspective by him. Allen (1973:46) stated that one could study management in an orderly and rational fashion only if one could develop the relevant taxonomy or principles of classification.

He argued that:

“However, this foundation has not been laid for management. We lack a system for sorting, categorizing, labelling, and defining new and old management information. A commonly understood classification of management work is a tool, which will prove indispensable to the progress of the management profession. Such a taxonomy will facilitate the communication and dissemination of new management knowledge and will provide the basis for a logical definition of management terms.”

Rue and Byars (1989:49) stated that:

“While some progress was made, a unified theory of management has not been realized.”

Callaway (1999:21) for example expressed the opinion that:

“It is in this quest for the one special management technique that will ensure success that has led to the seemingly never-ending supply of management theories. Each of these, in their own way, contains a grain of truth, yet to date none have provided all of the answers. These various theories and techniques can be compared to a series of musical instruments. Each has a unique style and ability, but when taken together and used as part of a larger activity, they develop a synergy that transcends their individual contributions. This is very much like the real-life scenario that many of us face every day.”

Callaway (1999:1-2) further stated that for the managers, who felt the need to improve their management capabilities, or establish impressive bookshelves, there were and would always be books flowing from the learned consultants and academics on management styles or techniques. The themes of these books invariably promised, if implemented, immediate management successes and career advancement.

He was of the opinion that:

“At the very best these books promised pre-digested solutions, jumping on these bandwagons provide the manager a solution without having actually to think about the situation and formulate an original answer. Additionally, the implementation of these management solutions demonstrated to upper executives the manager’s incisive insight and cutting edge thinking. This

is how job enrichment, quality circles, participative management, managing by objectives and many other milestones on the pathway to effortless success were inflicted on the innocent and unwary. This is not to say these techniques have no merit – quite the contrary, many were and continue to be quite relevant. The issue is that in and on themselves, they are limited. Like so many things in life they must be used in moderation and appropriately. All too often the uncreative or unskilled manager turns to these trendy management fads as a substitute for the analysis and creativity required for effective leadership and problem resolution.”

More recently Drucker (2001:89), after many more years in the management fraternity and the publishing of more valuable work on management, concluded that:

“What is needed, therefore, is a redefinition of the scope of management. Management has to encompass the entire process.”

Hellriegel et al (2005:8) in their 2005 ‘international student edition’ argued that the manager has to perform the four basic functions of management: planning, organising, leading and controlling – the basic principles of the administrative management approach developed during the 1880s by Henri Fayol. The authors claimed that their book was totally designed on the most recent knowledge and views about the management discipline and proved that as Drucker and Callaway stated that the one special management technique still did not exist. In 2008 McDaniel and Gitman published their book ‘The future of business. The Essentials’ in which they still used the administrative management approach as the basis of their discussions.

The author of this thesis is convinced that most of the recent management literature and practices are to a large degree still supporting the administrative management approach. Existing management practices are not comprehensive, practical and integrated. This was possibly the reason for the basically continuous introduction of short duration programs by the industry. All the literature consulted concluded that the ideal management method did not exist at present.

Some of the main reasons why the author selected this topic for research were that:

- During the period, 1969 to 1970, the author was involved in the detail planning of the Elsburg Gold Mine Project. The planning procedures, utilised by the Johannesburg Consolidated Investment Company (JCI), the holding company, did not make provision for a comprehensive, practical and integrated planning process.
- In 1973 the author carried out a research at Sasol’s Sigma Colliery for the purpose of compiling a dissertation for the degree, Magister in Business Leadership (MBL). The research indicated that there was not an integrated planning framework and a comprehensive and integrated management method on the mine (Stone, 1973:113).
- The author carried out the planning and commissioning of the modern Matla Colliery during the period, 1978 to 1981 without the aid of a comprehensive, practical and integrated management method because such a method did not exist at the time.

- During August 1986 the author attended a senior executive management course in strategic planning at the University of Columbia's Arden House satellite campus in the State of New Jersey, United States of America. The course was attended by a total of 94 delegates from 19 different nationalities from western and eastern countries. The author came to the realisation that the program leaders also advocated the same management practices and planning processes and structures, used in the South African mining industry. It would also appear that, according to the comments and contributions of the delegates attending the program, no uniform structures for planning and management exist in the Western and Eastern world countries.
- In 1997 the author carried out a mine-wide safety review on all the organisational levels at the Matla Colliery. The results indicated that employees on all the organisational levels in general rated their managerial competency unrealistically high and had an extremely inadequate knowledge of a comprehensive, practical and integrated management theory. The unacceptable high accident frequency rate and the general lower than planned performance in all areas of the colliery could mainly be attributed to the relatively low managerial knowledge and competency of the employees. A comprehensive, practical and integrated management method did not exist because the theory to develop such a method did not exist at the time (Stone, 1997:4).
- With the commencement of the closure of the Ermelo Colliery in April 1997, the author had already developed most of the main principles of the comprehensive, practical and integrated management method (Stone, 2000:1 - 87). The application of these principles resulted in that a total profit of R33 million compared to the original budget of a nil profit was realised and that no accidents occurred. This could be ascribed to the fact that the comprehensive, practical and integrated management method enabled every employee to determine the results required from him, develop his own objectives, and determine the tasks to be performed and to develop the relevant work procedures and control measures required. More effective delegation and integration could be achieved (refer section 6.2).
- A management competency survey on the Eyesizwe group of collieries was carried out by the author in September 2004. The results revealed that no formal logical integrated planning processes and structures existed on all the levels in the group. The managerial competency on all levels was extremely low (Stone, 2004:11).
- Throughout the author's 40 years involvement in the copper, gold, diamond and coal mining sectors he never came across a comprehensive, practical and integrated management method.
- The mining houses and therefore the industry still continue with the periodic introduction of single-topic short-lived management programs and practices as the only means to achieve the required results and improve managerial competency (refer section 4.2.2 and 4.2.3).
- During discussions with senior personnel of the main South African mining houses it was established that not one of the mining houses practised a comprehensive, practical and integrated management method. All agreed that a method that would enable all the employees on all the levels of the industry would be required in order to optimally utilise the resources at the disposal of the industry.

## **1.4 DEFINITION OF THE RESEARCH PROBLEM**

It appeared that the industry was not positioned to optimise the resources at its disposal. The problem identified for further research was defined as follows:

A comprehensive, practical and integrated management method that would enable all the employees, on all the levels of the organisation, to plan and manage for the results required from each one of them in a comprehensive, practical and integrated manner at all times did not exist.

## **1.5 HYPOTHESES**

### **1.5.1 Primary hypothesis**

A comprehensive, practical and integrated management method did not exist in the South African mining industry.

### **1.5.2 Secondary hypotheses**

- 1.5.2.1 The theory and procedure to implement a comprehensive, practical and integrated management method did not exist in the practical situation in the South African mining industry.
- 1.5.2.2 Existing management theories individually or combined were inadequate to develop the theory for a comprehensive, practical and integrated management method.
- 1.5.2.3 Existing planning processes and structures were totally inadequate to enable management to plan comprehensively on all the levels of the organisation and the organisation as a whole.
- 1.5.2.4 An empirical research methodology to effectively research the magnitude of the managerial deficiencies can be designed.
- 1.5.2.5 As a result of the lack of a comprehensive, practical and integrated management theory and procedure the managerial competencies of employees were unacceptably low.
- 1.5.2.6 Some components of the existing management theories can totally or to some extent or in combinations be modified and utilised to develop the theory for a comprehensive, practical and integrated management method.
- 1.5.2.7 Additional management theory required to develop a comprehensive, practical and integrated management method can be developed.
- 1.5.2.8 A procedure to implement the comprehensive, practical and integrated management theory in practice can be developed.
- 1.5.2.9 The procedure developed in this thesis will be sufficient to enable management to successfully implement the developed theory in practice in the South African mining industry.
- 1.5.2.10 The developed comprehensive, practical and integrated management method will completely comply with the management requirements in the mining industry.



## **1.6 THE RESEARCH QUESTIONS**

### **1.6.1 Primary research question**

The research question, which formed the crux of this thesis, was phrased as follows:

Does a comprehensive, practical and integrated management method for the South African mining industry exist and if not can it be developed?

### **1.6.2 Secondary research questions**

1.6.2.1 Can the requirements for a comprehensive integrated management method be specified?

1.6.2.2 Can the relevant theory for a comprehensive, practical and integrated management method be identified from available existing literature?

1.6.2.3 Should all the required theory not exist would it be possible to identify the relevant management components of existing management theories that can be utilised to develop the theory for a comprehensive, practical and integrated management method?

1.6.2.4 Can the identified theories be utilised and where necessary adapted or modified to develop the theory for a comprehensive, practical and integrated management method?

1.6.2.5 Would it be possible to develop additional management theory to fill the identified deficiencies should adequate management elements not be identified?

1.6.2.6 Would the proposed theory fully comply with the theory required for the comprehensive, practical and integrated management method?

1.6.2.7 Can a logical comprehensive, practical and integrated management planning process and structure be identified from the literature or the practice, if not can it be developed?

1.6.2.8 Would it be possible to develop a procedure to implement the theory developed for the comprehensive, practical and integrated management method in practice?

1.6.2.9 Would the proposed method fully comply with the requirements for a comprehensive, practical and integrated management method?

1.6.2.10 Would the proposed method make the envisaged contribution to the improvement in organisational performance on all the levels of the mining industry?

## **1.7 OBJECTIVES OF THE STUDY**

### **1.7.1 Primary objective of the study**

Should it be proved that the theory and method for comprehensive, practical and integrated management did not exist in the South African mining industry the objective would be:

To develop the theory and procedure that would fully comply with the requirements for comprehensive, practical and integrated management in the industry.



## **1.7.2 Secondary objectives of the study**

The secondary objectives of this study were to:

- 1.7.2.1 determine whether a comprehensive, practical and integrated management method does exist in the South African mining industry,
- 1.7.2.2 identify the relevant theory that can be utilised in the development of the theory for a comprehensive practical and integrated management method,
- 1.7.2.3 develop the necessary additional management theory required for the development of a comprehensive, practical and integrated management method for the South African mining industry,
- 1.7.2.4 develop a procedure to implement the comprehensive, practical and integrated management theory in practice,
- 1.7.2.5 prove that the proposed theory and procedure would fully comply with the requirements for a comprehensive, practical and integrated management method,
- 1.7.2.6 prove that the method is valid and practically applicable in all practical management situations in the South African mining industry,
- 1.7.2.7 prove that existing management planning processes and structures are inadequate to plan on a comprehensive, practical and integrated basis, and
- 1.7.2.8 develop from the newly developed theory an effective and integrated management planning process and structure.

## **1.8 KEY ATTRIBUTES OF THE DESIRED THEORY AND METHOD**

### **1.8.1 Key attributes of the desired theory**

The desired theory should:

- 1.8.1.1 contain all the necessary management components required to support the theory for a comprehensive, practical and integrated management method at all times, and
- 1.8.1.2 enable all employees to apply the theory in all management work required from them in order to deliver the results required from them.

### **1.8.2 Key attributes of the desired method**

The desired method should consist of the appropriate theory and procedure to apply it in practice. It should enable the organisation and all the employees to:

- 1.8.2.1 manage at all times in a comprehensive, practical and integrated manner for the achievement of the results required from each of them,
- 1.8.2.2 plan comprehensively from the top down to the lowest levels of the organisation for the results required from each of them,
- 1.8.2.3 coordinate and integrate all the tasks with all the relevant stakeholders,
- 1.8.2.4 communicate comprehensively in all directions,



- 1.8.2.5 exercise effective control for the efficient achievement of the planned results,
- 1.8.2.6 react rapidly to any significant changes, and
- 1.8.2.7 integrate and computerise the individual and total plans.

## 1.9 THE RESEARCH PROCESS

The research comprised a theoretical literature research and an empirical research respectively. It was based on a combined method utilising the theories of Kothari (1990:13-40) and Hawkins and Weber (1980:115-225). The theoretical assessment comprised a literature study of all, as far as practical possible, recent and relevant available national and international management theories, researches and practices. Facilities such as libraries, journals and information locally and on the Internet were consulted. It was analysed and evaluated in terms of its practical applicability. It was finally summarised and formulated into a single representative view of available management practices.

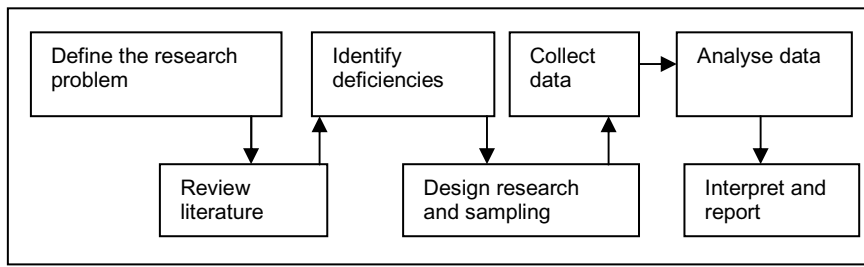
The research design contained a clear statement of the research problem, procedures and techniques for gathering the required data, the population to be studied and the methods to be used for the processing and analysing of the data. It was in essence the vehicle with which the required data was collected, analysed, processed and presented in a manner that fully supported the solving of the research problem.

Kothari (1990:39) described research design as:

“the research design is the conceptual structure within which research is conducted; it constitutes the blueprint for the collection, measurement and analysis of data. As such the design includes an outline of what the researcher will do from writing the hypothesis and its operational implications to the final analysis of data. More explicitly, the design decisions happen to be in respect of:

- (i) What is the study about?
- (ii) Why is the study being made?
- (iii) Where will the study be carried out?
- (iv) What type of data is required?
- (v) Where can the required data be found?
- (vi) What periods of time will the study include?
- (vii) What will be the sample design?
- (viii) What techniques of data collection will be used?
- (ix) How will the data be analysed?
- (x) In what style will the report be prepared?”

The design specified the relevant sources and types of information required to analyse and solve the research problem and the approaches used for the gathering and the analysis of the data. It, in addition, specified the time period as well as any possible foreseen restrictions.

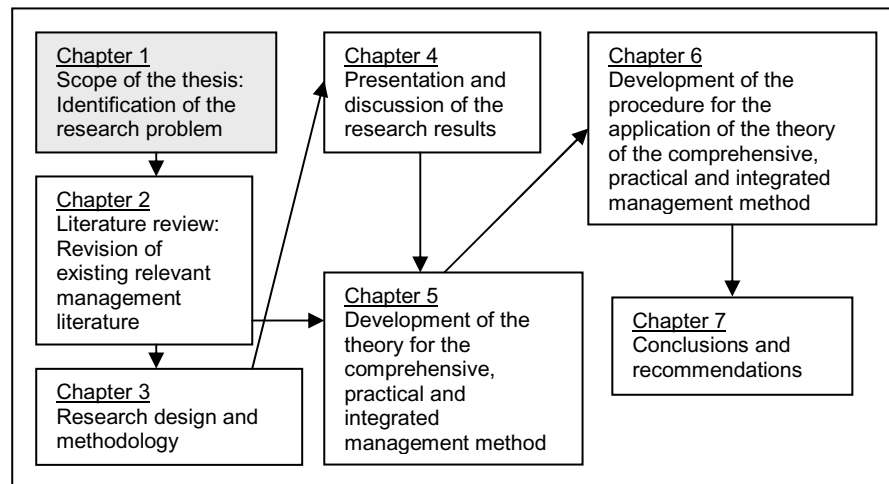


**Figure 1.13: The research flow diagram**

Means to overcome these restrictions were developed and formed part of the design. The design and methodology of the research were dealt with in more detail in chapter 3 of this thesis (refer figure 1.13). The research was entirely focused on the realisation of the research topic.

### 1.10 ORGANISATION OF THE STUDY

The analytical process that was followed in this thesis is graphically depicted in figure 1.14 below. It enabled the researcher to place the chapters in context with the overall objectives of the thesis and furthermore it indicated the relative positioning of each chapter. The thesis was designed to enable the most meaningful development and realisation of the objectives.



**Figure 1.14: Chapter 1 in context to the overall thesis**

The purpose with figure 1.14 was to provide the reader with a roadmap to the comprehension of the thesis. It shows chapter 1 as the structural overall approach to the research and the development of the thesis. Within the ambit of this chapter the key components of the thesis were explained in lieu of the objective to:

- research the existing relevant management literature for the existence of a comprehensive, practical and integrated management method,
- establish the situation with management practices in the South African mining industry,
- develop the additional theory should it be required,
- develop a procedure to implement the theory in the practical situation, and
- develop a comprehensive, practical and integrated management process and structure.

### **1.10.1 Chapter 1: Scope of the thesis**

This chapter dealt with the:

- 1.10.1.1 introduction to and background of the South African mining industry,
- 1.10.1.2 historical and current state of the South African mining industry,
- 1.10.1.3 contribution of the mining industry to the economy of South Africa,
- 1.10.1.4 challenges facing the mining industry,
- 1.10.1.5 statement of the research problem,
- 1.10.1.6 objectives of the study,
- 1.10.1.7 brief description of the research process, hypotheses and research priorities, and
- 1.10.1.8 key attributes of the desired theory and the desired management method.

### **1.10.2 Chapter 2: Literature review**

This chapter dealt with the:

- 1.10.2.1 statement of the requirements for a comprehensive, practical and integrated management method,
- 1.10.2.2 analysis of the most relevant management theories of the management discipline. The management practices, functions, activities and processes would be analysed, evaluated and discussed in terms of the requirements of a comprehensive, practical and integrated management method,
- 1.10.2.3 presentation of a concise evaluation of the literature reviewed,
- 1.10.2.4 identification of the perceived theoretical shortcomings of the literature, and
- 1.10.2.5 identification of the perceived theoretical management gap.

### **1.10.3 Chapter 3: Research design and methodology**

In this chapter the:

- 1.10.3.1 research design and methodology was explained,
- 1.10.3.2 method of research was developed,
- 1.10.3.3 questionnaires were developed,
- 1.10.3.4 rating method was presented and explained,
- 1.10.3.5 questions in the questionnaire were explained, and
- 1.10.3.3 minimum sample sizes as well as the mechanisms to validate the results and findings were justified.

### **1.10.4 Chapter 4: Presentation and discussion of the research results**

In this chapter the:

- 1.10.4.1 research results were presented,
- 1.10.4.2 research results were evaluated and discussed,

- 1.10.4.3 research results were compared against the stated requirements of the comprehensive, practical and integrated management method,
- 1.10.4.4 main patterns of the results were analysed and interpreted, and
- 1.10.4.5 deficiencies in practice were outlined.

#### **1.10.5 Chapter 5: Development of the theory of the comprehensive, practical and integrated management method**

In this chapter:

- 1.10.5.1 the elements of the relevant existing useful theories were identified,
- 1.10.5.2 additional theory was developed and proposed,
- 1.10.5.3 the developed theory was classified in a logical manner,
- 1.10.5.4 a comprehensive, practical planning process was developed and proposed, and
- 1.10.5.5 a practical planning structure for the industry was developed and proposed.

#### **1.10.6 Chapter 6: Development of the procedure for the application of the theory of the comprehensive, practical and integrated management method**

In this chapter:

- 1.10.6.1 a procedure was developed to implement the theory developed in chapter 5,
- 1.10.6.2 practical examples were used to illustrate the correct interpretation of the theory and procedure, and
- 1.10.6.3 the comprehensive, practical and integrated planning process and structure were used to ensure that the proposed method was correctly implemented.

#### **1.10.7 Chapter 7: Conclusions and recommendations**

In this chapter:

- 1.10.7.1 the main findings were summarised,
- 1.10.7.2 the attributes of the developed management method were compared with that of the administrative management approach.
- 1.10.7.3 the most important recommendations were proposed, and
- 1.10.7.4 topics for further in-depth research were outlined.

### **1.11 CONCLUSION**

The South African mining industry survived and prospered for approximately one hundred and twenty years under fluctuating economical conditions, various political dispensations, volatile labour situations, a fierce competitive global environment and a relatively complex and mining-unfriendly environment. All indications were that the industry played an extremely important and supportive role in the South African economy in the past. It appeared that it will continue to be one of the most important role players in the South African economy for a very long period in the future.

Preliminary investigations indicated that the industry was utilising the same management practices that most organisations in the country and for that matter in many other countries of the world apply. There was, however, serious concern with the industry's performance in growth, productivity, containment of cost, competitiveness and health and safety in general compared with that of prominent mining concerns in other countries (refer sections 1.2.9.1 and 1.2.9.7).

The perception was that available management practices were inadequate to enable the industry to manage efficiently in a comprehensive, practical and integrated manner. These management practices did not cover management work in a comprehensive, practical and integrated manner. Events such as unplanned risks, whenever they do occur, were therefore individually identified, analysed and evaluated normally by a separate department that not necessarily had the required experience, authority and accountability. Under these constraints it was impossible for the industry to optimise the available resources and potential of its employees. The safety in the mining industry still remains a matter of serious concern (refer section 1.2.9.1). The identification and evaluation of risks should be a continuous process and part of the planning and normal daily management work of every employee.

It was surmised that the inadequacy of existing management practices constituted one of the main reasons for the industry's deteriorating global competitiveness. The development of an efficient management method for the industry, that would enable it to manage in a comprehensive, practical and integrated manner on all the levels of the organisation, was considered to be the solution.

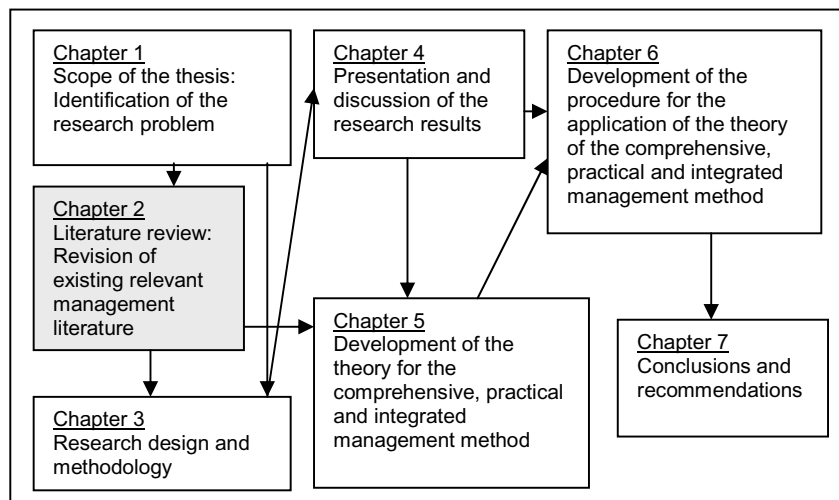
In the next chapter the existing relevant available management theories and practices in the world, as far as practically possible, would be evaluated. The objective is to determine to what extent the literature complied or did not comply with the requirements for the theory for a comprehensive, practical and integrated management method and what additional theory should be developed.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 INTRODUCTION

It was argued in chapter 1 that the theory for a comprehensive, practical and integrated management method did not exist in the South African mining industry and that existing planning theories, processes and structures in particular were totally inadequate to enable management to manage in a comprehensive, practical and integrated manner (refer section 1.5.1 and 1.5.2.3). In addition it was perceived that existing management theories could be inadequate to develop the desired management method, planning process and structure (refer section 1.5.2.2). It was also hypothesised that should existing management theories proved to be inadequate, some of it could be utilised together with newly developed theories in order to develop the complete theory for the desired comprehensive, practical and integrated management method, planning process and planning structure (refer section 1.5.2.6 and 1.5.2.7).



**Figure 2.1: Chapter 2 in context to the overall thesis**

In this chapter existing management theories and practices were scrutinised where feasible to ascertain whether a comprehensive, practical and integrated management theory and logical integrated management planning process and structure do exist. It was evaluated with a view to establish which of the theories and practices could be utilised in the development of a comprehensive, practical and integrated management method and integrated management planning process and structure. The objective was to determine to what extent existing theories and practices differ from or comply with the requirements for a comprehensive, practical and integrated management method (refer section 2.2.1).

In the event where theories or practices do not fully comply with the requirements for a comprehensive, practical and integrated management method and the development of a logical integrated management planning process and structure, those components that could be utilised for purposes of developing the new theory were identified and selected for further development where necessary. At the end the perceived theoretical deficiencies of existing literature were identified.

## 2.2 REVISION OF THE LITERATURE

The main emphasis of the revision was on the management processes and their applicability in the practical situation. It focused primarily on the area of management planning, more specifically the management planning processes and structures, as it is surmised that the planning function should form the basis for the development, utilisation, coordination and integration of the other management functions. Stoner (1982:129) argued that before managers can organise, lead and control they must first make the necessary plans to give direction to the organisation (refer section 2.6.2.1, 2.6.2.1 (a) and figure 2.21).

Most theorists supported the view that planning must first be performed and then the organisational structure could be developed, the people placed and influenced to realise the plans. Only then control could be exercised. This view indicated that the management work of planning not only forms part of management but that it is indispensable for efficient management.

The research was demarcated in order to focus on the specific literature in respect of the necessary elements of management. It therefore concentrated on the following management concepts:

- Management and leadership,
- The work managers and leaders have to perform,
- The management environment in which the organisation must realise its objectives,
- Management planning,
- Past and existing management practices, and
- The classification of the management functions and activities were concentrated on. The advantages and disadvantages of each were analysed and discussed.

In this chapter management functions and activities respectively have the following meanings:

- A management function refers to a main management task, consisting of related work aimed at the achievement of results directly contributing to the main results of the organisation.
- A management activity refers to a secondary related management task that has to be performed to contribute to the achievement of the results required by the specific management function (refer table 2.4, 2.5 and 2.6).

- A management element is a sub task of an activity. The total number of elements would eventually comprise a management activity and the total sum of the activities would comprise a management function.

### **2.2.1 Requirements for a comprehensive, practical and integrated management method**

Most management authors, theorists and practitioners viewed the management work of a manager as a logical process consisting of the functions of planning, organising, leading and controlling. DuBrin (1994:26) supported this view by stating that every employee must plan and make decisions, organise, lead and control the resources they need to utilise for the achievement of the results expected of each of them.

It is the author's reasoned opinion that a suitable management method would enable every employee, from the chief executive to the operator, to manage comprehensively for the results required from him. Only then optimal results could be achieved. From the chief executive the results required would be that what the owners want. This process should be cascaded down to the lowest positions.

The degree or sophistication of management work would obviously differ from level to level and position to position but the basic management principles would be the same for every employee. In the case of the chief executive the management work of forecasting for example would be much more advanced than in the case of the operator – but each needs to perform this work however complicated or simple.

At this stage of the thesis it is perceived that an efficient comprehensive, practical and integrated management method should, where applicable, enable every employee in the organisation from the top down to the lowest level to perform the following tasks:

2.2.1.1 Plan for the results required from him – this would entail the following management tasks:

- a) identify opportunities and deviations from planned performance,
- b) determine and forecast the most probable results,
- c) state the most probable achievable results,
- d) formulate the objectives,
- e) develop alternative methods to realise the formulated objectives,
- f) develop the tasks required for each alternative method,
- g) develop performance standards that each task should comply with,
- h) analyse the tasks and establish the resources required for each task of every alternative method,
- i) assess all risks,
- j) schedule the work flow for each alternative method,
- k) budget for each alternative method,
- l) select the best method,
- m) develop the necessary policies and procedures,



- n) determine the job specifications or requirements,
- o) develop the necessary posts,
- p) develop the most functional organisational structure,
- q) delegate accountability to each post,
- r) determine the communication lines,
- s) determine the lines of authority,
- t) create the necessary relationships among posts and levels,
- u) determine supervisory accountabilities,
- v) affect proper coordination,
- w) optimise, computerise and compile the written plan,
- x) obtain the most competent people,
- y) develop realistic training and management development programs and schedules, and
- z) develop and maintain a logical and practically integrated planning structure.

2.2.1.2 Whenever necessary the employee should be able to:

- a) make sound decisions,
- b) communicate efficiently,
- c) motivate people,
- d) develop recruiting specifications,
- e) recruit people,
- f) appoint people,
- g) remunerate people,
- h) train and develop people,
- i) measure performance,
- j) evaluate performance, and
- k) correct deviations.

At this stage it is not possible to classify the above tasks under management functions. A method to logically and systematically develop and analyse management work needs therefore to be developed.

### **2.2.2 Methodology of revision**

The theoretical revision comprised a literature study, as far as practically feasible, of all recent and relevant available national and international management theories, practices and research reports. Facilities such as libraries, journals and information locally, abroad and on the Internet were consulted. It was analysed and evaluated in terms of its compatibility with the perceived requirements of a comprehensive, practical and integrated management method (refer section 2.2.1). In the case where the existing theory was inadequate to develop the desired management method, the theory that could be utilised to assist in developing such a method was identified.

### **2.2.3 Demarcation of the literature**

The boundaries of the research literature, as mentioned in section 2.2, were demarcated to:

- 2.2.3.1 the concept of management,
- 2.2.3.2 what managers have to do?
- 2.2.3.3 the concept of leadership,
- 2.2.3.4 what leaders have to do?
- 2.2.3.5 the environment in which management operates,
- 2.2.3.6 management practices,
- 2.2.3.7 the classification of the management work, and
- 2.2.3.8. management planning processes and structures.

### **2.2.4 Framework for revision**

The existing literature was revised in terms of:

- 2.2.4.1 whether it did comply with the perceived requirements of a comprehensive, practical and integrated management method (refer section 2.2.1),
- 2.2.4.2 its adequacy to develop the necessary management theory for the development of the perceived comprehensive, practical and integrated management method,
- 2.2.4.3 whether any or part of any management theory or practice could be utilised or modified in order to develop a comprehensive, practical and integrated management method,
- 2.2.4.4 whether additional management theory needs to be developed in order to develop a comprehensive, practical and integrated management method, and
- 2.2.4.5 whether it supported the development of a logical integrated management planning process and structure.

## **2.3 MANAGEMENT**

### **2.3.1 The concept of management**

Many management authors interpreted the concept of management differently. Tsoukas (Ackroyd & Fleetwood, 2000:26) concluded that up to the present time it had not been easy to answer the question of what management is. Taylor generally regarded as the father of the scientific management approach, with his extensive shop floor experience had a different perception of management than the theorists who dealt exclusively with the upper echelons of management (refer section 2.5.1.1 (b)). When referring to the fair and humane treatment of employees and the legitimate expectations of the company, Taylor emphasised that the best type of management was the one where ordinary workmen gave their full initiative and effort and in return received a just reward from their employers (Taylor, 1917:34).

Fayol (1949:43-110), generally credited with the development of the administrative or process management approach, viewed management as a process. He classified management work initially into the five management functions of planning; organising, commanding, directing and controlling (refer section 2.5.1.1 (d)). Massie and Douglas (1977:31) defined management as the process by which a cooperative group directs actions of others toward the realisation of common objectives. Griffin (1987:8-9) defined management as the process of planning and decision-making, organising, leading and controlling an organisation's human, financial, physical and informational resources.

According to DuBrin (1994:5) management is the process of using organisational resources to realise organisational objectives. Bateman and Snell (2002:14) defined management as the process of working with people and resources in order to accomplish organisational goals.

Hellriegel et al (2005:7) argued that:

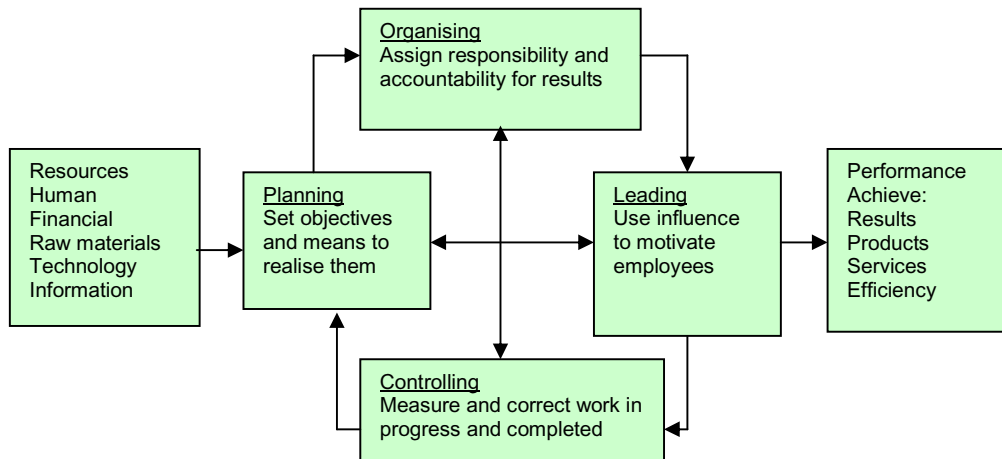
**“Management** refers to the tasks and activities involved in directing an organisation or one of its units: planning, organizing, leading, and controlling.”

According to McDaniel and Gitman (2008:210) management is the process of guiding the development, maintenance, and allocation of resources to realise the objectives of an organisation. In summary it appeared that most management theorists regarded management as a process (refer figure 2.2). It implied that management can be regarded as the process of planning, organising, leading and controlling an organisation's human, financial, physical and informational resources in order to realise predetermined organisational objectives in the most efficient manner.

Drucker (1999:39) emphasised that:

“Management must focus on the results and performance of the organisation. Indeed the first task of management is to define what results and performance are in a given organisation – and this, as anyone who has worked on it can testify, is in itself one of the most difficult, one of the most controversial, but also one of the most important tasks. It is therefore the specific function of management to organize the resources of the organisation for results outside the organisation.”

Further on in this thesis it was shown that management is not the preserve of managers and the man at the apex of the organisation alone. It forms part of every employee's work (refer section 2.2.1). De Villiers (1973:15) pointed out that the degree to which people manages, increases the higher up in the organisation the employee is employed (refer figure 2.3). Management also refers collectively to the managers of the firm, the individuals who carry out the process of management. Some theorists maintain that management consists of people, mainly at the top, generally being seen as responsible for realising the objectives of the organisation (Hellriegel et al, 2005:7).



**Figure 2.2: The management process**

It is clear from these definitions that management can be regarded as the work any employee performs in the process of optimising the production resources; people, money, time and material in order to realise the objectives of an organisation most efficiently at all times. Successful management is regarded as the key to the success of an enterprise (Bedeian & Glueck, 1983:7).

### 2.3.2 What managers have to do?

Drucker (1968:13) stated that a manager is someone who plans and makes decisions, organises, leads and controls human, financial, physical and informational resources. Bedeian and Glueck (1983:5) pointed out that managers coordinate the human and physical resources required for maintaining the objectives and services of society. Managers represent a specific objective and in the long run the realisation of one of the objectives that would directly support the optimal realisation of one of the objectives which in itself constitutes one of the main components of the final or general objective of the manager and that of the organisation.

Adizes (1979:135) commented that:

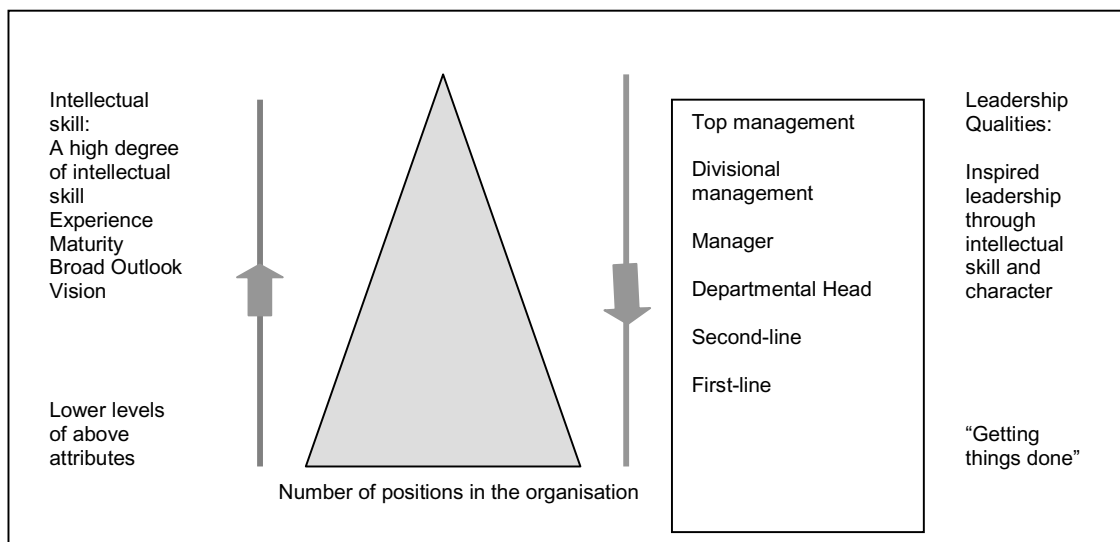
“the role of a competent manager is to create an environment in which the most desirable things are most likely to happen.”

Callaway (1999:11 - 12) argued that managers are the organisers who, when given the objectives and direction, initiate and develop the plans and processes for every step of the way. He argued further that managers normally seem unable to set the direction or establish the strategy themselves in the first place.

Hellriegel et al (2005:7) maintained that:

“A **manager** is a person who plans, organises, leads, and controls the allocation of human, material, financial, and information resources in pursuit of the organisation’s goal.”

As the manager moves up the management hierarchy the essential management abilities or competencies required and work vary usually in scope and detail (refer figure 2.3). The more efficiently the manager performs his management work the more efficiently the results required would be achieved. To be able to perform optimally the manager must have the required intellectual skills, leadership qualities, competency and the necessary resources and organisational structures at his disposal. He needs to know, understand and be competent in the application of management work.



**Figure 2.3: The changing nature of managerial ability**

Source: De Villiers (1973:15)

Drucker (1968:20-26) and Donnelly et al (1998:19) reasoned that a manager’s first job is to manage a business, his second job is to manage managers and his third job is to manage the workers and the work. A manager is responsible for the work performance of other people. He must plan and make decisions, organise, lead and control human, financial, physical and informational resources and create an environment that would be conducive to optimal performance (Adizes, 1979:135).

From the previous views it appeared that the manager does not necessarily set the direction for the company or ‘lead’ the company. Somebody else or the leader sets the direction for the company (refer section 2.3.4). According to Daft (1995:14) the ultimate responsibility of managers is to achieve and maintain high performance standards. The manager is the person that pursues the predetermined direction by achieving the required results through people by performing the management work of planning, organising, leading and controlling. He must, when given the objectives and direction, initiate

and develop the plans and processes to realise these objectives. This reasoning implied that there is a definite difference between management and leadership. Further on it was shown that this 'difference' is not as clear-cut as some management authors would like it to be (refer section 2.3.5).

### **2.3.3 The concept of leadership**

Leadership existed, since times immemorial, and would continue to exist as long as mankind itself exists. Today it is regarded by many management authors, theorists and practitioners as one of the most decisive managerial ingredients for any organisation to prosper and survive in the fierce competitive national and global environments. Leadership exists in all human activities such as politics, military operations and on the sport fields to mention only a few. It is multidimensional in skills and orientation and it should understand people, organisations, processes and structures (Gallos, 2007:3).

Rost (1993:105) viewed leadership as a noncoercive relationship based on influence. According to Chemers (1997:1) leadership appeared to be some kind of a process, act or influence that in some way gets people to do something by inspiring, organising, persuading or influencing them. Maddock and Fulton (1998:5), on the other hand, saw leadership as motivation and that the leader essentially is a motivator. According to Burns (1998:11) leadership is an influence relationship between leaders and followers who intend real changes that reflect their mutual purposes.

Fundamentally leadership is the work of influencing people to realise the 'ideals' of the leader (Burns, 1998:11) and (Manz & Sims 2001:39). According to Black and Porter (2000:401-402) leadership is undeniably a managerial process. Most experts on leaders and leadership development are of the opinion that one of the most important contributions of a leader is to help create a vision that brings with it commitment to organisational excellence and directs change efforts.

Bush (2003:53) argued that leadership is automatically ascribed to the person at the apex of the hierarchy, which implied that there can be only one leader in the organisation. Leadership is based to a large extent on the ability of persuasion. It is one of the oldest human abilities and if judiciously applied it can be a strong ingredient of efficient leadership (Knowles & Linn, 2004:117).

Yukl (2002:7) defined leadership as:

"the process of influencing others to understand and agree about what needs to be done and how it can be done efficiently, and the process of facilitating individual and collective efforts to accomplish the shared objectives."

Some authors questioned the exclusivity of leadership. Charlton (2000:63-64) was of the opinion that leadership can no longer be the preserve of the 'man' at the top and that there is now a real need for leadership to filter down to the different layers of the organisation as a whole.

Leadership can occur anywhere in the organisation, and is not a set of behaviours limited to or reserved for the chief executive officer or top management alone. It could be seen as an interpersonal process involving attempts to influence other people in realising desired objectives. The sooner this fact is accepted the sooner leadership can be comprehensively extended down to the lowest levels in organisations where the majority of activities occur. The operator would sometimes have to take the initiative where conditions require an immediate action such as in emergency situations. In many cases in the past it happened that operators took the lead. Normally an underground section would have an official leader, the team leader and an unofficial leader, one of the team members.

Drucker (1992:121) stated that:

"The foundation of effective leadership is thinking through the organisation's mission, defining it and establishing it, clearly and visibly. The leader sets the goals, sets the priorities, and sets and maintains the standards."

From the above views it could be concluded that the leader sets the direction of an organisation. Leadership in general is a process that entails either one or a combination of 'influencing, motivating, inspiring, organising, impressing, persuading or encouraging' people to act in a desired way. In the exceptional situation it would appear that impelling and 'making happen' or coercion could also be acceptable.

In summary it can be concluded that leadership entails the initiation of new directions for an organisation in order to optimise performance and to exploit new, probably more profitable, opportunities. It is the influencing of the stakeholders, subordinates, peers and where necessary the supervisor and upper management to voluntarily follow the leader's initiative. Leadership would always be an indispensable ingredient of any organisation's management if it were to survive in the increasing national and global competitive environments. It formed and would form the main management component in growth, new ventures, mergers and takeovers simply because leaders by nature are more inclined to 'see' opportunities when most managers do not.

#### **2.3.4 What leaders have to do?**

According to Charlton (1992:25) leaders think in terms of the future, foster change, and rely on people and do the right things right. Oden (1997:27) felt that, in the traditional companies of the past, leaders

exercised mainly command authority and that managers were technical experts who defined the jobs of their employees.

A leader, in the work situation, is automatically in a position of authority. To work under authority is a form of obedience to superior, group and social behaviour, norms, authority and in the present day to instructions. It existed since the advent of the human race (Homans, 1965:417). The leader has command authority, which implies that subordinates, without proper justification, may not simply ignore or disobey legitimate commands, suggestions or instructions – or introduce new ideas on their own.

In essence the leader is a person who, because of his unique abilities and position would be inclined to initiatively and intuitively 'take people' along in realising his predetermined 'dreams'. The adage that leaders are 'people who do the right things right' is questionable. The history of organisations and institutions, since times immemorial, is littered with glaring examples to the contrary. Many serious mistakes, some with catastrophic consequences to organisations and people, were also the result of impulsive or possibly incompetent leadership.

Leadership can not be the preserve of the man at the top only because all employees need to exercise leadership in varying proportions. In practice one would find leadership on all the levels in the organisation and society depending on personalities and situations. Leaders need not to be told to lead, they would take the lead intuitively and most of the time would not even realise that they had done so. A leader is someone who sets the direction, creates alignment and maintains commitment in groups of people who share common work.

### **2.3.5 The difference between managers and leaders**

Most theorists and practitioners of the management discipline endeavour to draw a clear distinction between leaders and managers. Some still view managers and leaders as synonymous. Schuitema (1998:121) stated that the difference is that managers are primarily held accountable for results. Bjerke (1999:57) argued that the main difference is that a leader is an individual within an organisation with a natural ability to influence the attitudes and opinions of others whereas a manager is normally instructed by the owners of the organisation or the executive management to influence the actions and decisions of subordinates in order to deliver the planned results. Callaway (1999:13-18) reasoned that leaders have a natural orientation, a far-reaching objective, a vision coupled with a strong determination to achieve an objective and the ability to inspire others to act. Management is about coping with change and leadership (Gallos, 2007:6). Organisational change can push people out of their comfort zones that challenge their vested interests. This could cause them to sometimes react negatively to the best interests of the company (Buchanan & Badham, 2008:6).



For success, there must be a balance between the discipline associated with management and the inspiration brought by the leader and an overlapping phase from leaders to managers. Williams (2000:694) stated that leadership and management are required in varying proportions on all the levels of the organisation depending on the specific situation and managerial position. The general difference between a manager and a leader could be summarised as that the manager mostly concentrates on meeting the expectations of others and deals mainly with organisational complexity while the leader deals with change and as such they are complementary (Stankard, 2002:123).

## **2.4 THE EVOLUTION OF MANAGEMENT**

The practice of management is as old as mankind itself. Archaeological evidence proved that the use of organisations could be traced back to the times when man started to live, probably out of necessity, in organised groups. Many groups of early human civilisations succumbed to famine, diseases or enemies but some of those that were more organised and produced and stored surplus food managed to survive in the long run (Homans, 1965:454). One of the earliest references to organised management is found in the Bible in the book of Exodus where Jehthro, the father-in-law of Moses advised him to stop being a one-man manager. The five thousand year-old written inventory control accounts of the Sumerians are the oldest management literature discovered to date (Fulmer, 1983:6). The construction of the pyramids, can be traced back approximately to 3 000 years B.C (Daft, 2000:45). There were relatively large successful nations such as the Macedonians under Alexander the Great, the Persians and later the Romans, long before the birth of Christ, all of which required the extensive application of management principles (Mescon et al, 1988:39).

About five centuries B.C the Chinese extensively practiced the management functions of what is today known as planning and directing. Sun Tzu, the famous Chinese military leader, wrote approximately 500 B.C about his views on principles of leadership ideas, of which many are still regarded as valid today (Black & Porter, 2000:33). Around 400 B.C Socrates discussed management practices and concepts. According, to Ivancevich et al (1997:32) the Greeks were aware that maximum work output could be achieved easier by using uniform methods at a set work pace. The Roman Empire dominated the world for approximately 550 years. The Roman Catholic Church, 42 A.D. to present, is probably the oldest and the most successful organisation in the history of Western civilisation (Hodgetts, 1981:6).

Machiavelli, born about 500 years ago in Florence, Italy, made a systematic analysis of the work of a leader and from it derived practical principles that are still valid and useful today. During the fifteenth and sixteenth centuries city-states in Europe, such as Venice and Florence were managing certain activities with procedures that one would consider today as 'modern' (Black & Porter, 2000:34). Every early successful organisation that rose to prominence and power, albeit on the short or long-term, applied management principles in some or other form (Hodgetts & Kuratko, 1988:28-30).

### 2.4.1 The development of the management discipline

For centuries business management was not considered a serious field of study (Griffin, 1987:38). The topic of how to manage an organisation only began to receive serious thought towards the beginning of the 20th century (Black & Porter, 2000:32). The development of the management discipline had not been one series of steps. It developed rather in relation to the needs of specific civilisations and countries. Much of what people knew about managing organisations was derived from personal experience.

Mescon et al (1988:41) said that the development of the management profession could mainly be attributed to mankind's interest and burning desire in finding the most efficient way of accomplishing a job. Initially organisations were relatively small and production of commodities was mainly centred in individuals and small family units (Hodgetts, 1981:6). Torrington et al (1989:12) claimed that as a result of the Industrial Revolution (1760-1830), commencing in England, technological innovation resulted in that production of goods changed rapidly and completely. The management discipline, as a result, had to develop accordingly in order to accommodate these new challenges.

The Revolution changed the field of management permanently and initially caused a lot of hardship by the very nature of the results of modernisation but it eventually resulted in greater prosperity and much better living conditions for the peoples of the civilised countries (Ashton, 1997:129). With it inevitably came technological advances related to mechanised power, which was the main impetus of the fundamental changes that took place in human work performance in the latter half of the 1700s. Up to that time, work was performed mainly through human or animal effort, sometimes aided by wind or waterpower. Because of the 'domestic system' it was difficult to perform more complex work, produce products that were more complex and to turn out goods in high volumes. The Industrial Revolution eventually affected management practices throughout the entire world.

Arnold Toynbee, the great historian, credited the rise of industrialisation mainly to James Watt for inventing the steam-driven engine and Adam Smith, generally regarded by many management thinkers as the first economist, for laying the foundation for the modern economy (Smith, 1893:3). Watt invented the steam engine in 1781 with rotary as opposed to vertical movement making machines more adaptable for application in factories (Wren, 1979:45).

The factory system made it possible to dramatically increase production volumes with all labour located within the confines of a single venue. This development not only made production of large volumes of more complex commodities possible but also enhanced more effective control and training. Management, for the first time, had to deal with increased numbers of people and the associated human relations challenges. They did not really have adequate experience to manage large groups of people (Hodgetts & Kuratko, 1988:31).

According to Fulmer (1983:14) Smith developed the basis for the modern economic approach and:

- laid the foundation for the free enterprise system as it is known today,
- developed the principal framework for transforming capital and labour into goods and services,
- popularised standardisation with his concept of *division of labour*,
- made a difference between the concepts of creating wealth and making money (Nersesian, 2000:20), and
- published, in 1776, his classic manifest for the capitalistic order, titled 'An Inquiry into Nature and Causes of the Wealth of Nations' or 'The Wealth of Nations' as it is popularly known today.

The concept of capitalism, as a creator of wealth, is going from strength to strength since its inception whilst the concept of Marxism, developed many years later, regarded by many economists as the opposite pole of capitalism, had so far only caused bankruptcy, anarchy and misery to the masses. Leszek Kolakowski in 'Main Currents of Marxism' stated that it could be said with little fear of contradiction that Marxism would eventually prove to be the least attractive form of intellectual life (Johnson, 1983:728).

With the advent of the Industrial Revolution the invention and development of patents and techniques more than doubled from 379 patents for the 1700 – 1760 period to 976 for the 1760 - 1790 period (Cronje et al, 1987:19). The necessity for improved methods of management became more crucial for the continued growth and survival of organisations.

Some of the major developments of the Industrial Revolution were: economic growth, reduced dependence on agriculture, a rising per capita income, a high degree of specialisation of labour, a widespread integration of markets and in general increased prosperity to peoples and countries (Deane, 1965:5-19). Overall the industrial revolution was certainly one of, if not, the most important developments in the progress of the human race.

New machinery was invented and commissioned and the scientific application of job specialization in the workplace was introduced. Endeavours were made to develop more efficient production methods. The textile and other industries became more mechanised with the increase of technical inventions forcing many small entrepreneurs gradually out of business. When it became apparent that it was more efficient to place all the machines in one locale and hire a workforce to come to the site to work, the factory system was established (Hodgetts and Kuratko, 1988:30).

As organisations became larger and more powerful, the management discipline became more complex and sophisticated. Technological innovations increased, governments became more involved with organisations and new management approaches were accordingly developed (Mescon et al, 1988:39).

Inadequate communication and transport initially delayed the development and spreading of new management principles and techniques. The growth of some of the earlier businesses was in many cases significantly retarded as a result. The economies of scale motivated managers to strive for further growth.

Meredith and Mantel, (2000:6) commented that the process of managing organisations had been impacted by three revolutionary changes since the 1980s that involve the:

- increase in replacement of traditional, hierarchical management by consensual management,
- establishing of projects to accomplish specific strategic changes, and
- increase in the application of the systems approach.

Systematic thought about management problems and issues, specifically efficiency, production processes and cost savings were stimulated by the opportunities created by mass production created by the Industrial Revolution (Bateman & Snell, 1996:32). Mass production in immensely larger quantities had become the norm since and a means of increasing the competitive edge of companies. The increased competition resulted in the acceleration of mechanisation in order for manufacturers to deliver at the lowest possible economical level.

#### **2.4.2 The study of management**

Prior to the Industrial Revolution, there were very few, if any, trained managers or supervisors, since this task had never existed before. In Britain, at that time, there were no professional managers, common body of knowledge about how to manage, codes of management behaviour or a universal set of expectations about how a manager should act. The need to address the process that would come to be known as 'management' became more imperative as Britain and the United States of America entered the nineteenth century and the Industrial Revolution became more widely spread (Black & Porter, 2000:36). Industrial development required higher production volumes in order to decrease and contain unit cost of goods as a result of the increased competition.

For several centuries management was not considered as a serious field of study. The formal study of management in terms of time is relatively recent (Daft, 2000:45). Griffin (1987:38-39) stated that from a scientific perspective point of view, it did not really begin to develop until the nineteenth century. Before the advent of the twentieth century, most people were more interested in utilising organisations to acquire wealth or political power or both. Very few thought on a systematic basis how to manage organisations. Peterson (1993:1-2) was of the opinion that, although academicians and practitioners had been writing on the subject of management at least since the late nineteenth century, the study of management and managerial behaviour was largely a post-World War II phenomenon.

Researchers and practitioners in the management theory became more knowledgeable about the factors influencing organisational performance with the advancement of supporting disciplines such as mathematics, engineering, psychology and anthropology or the study of humankind in all its aspects. This enabled them to perceive why certain earlier theories sometimes did not hold up and to develop new approaches to management (Mescon et al, 1988:41). In Britain it was then already realised that the engineering curricula should include management teaching if engineers are to become part of the management pool (Howells, 2005:219). The overwhelming number of management scholars at the time was full-time academics instead of management practitioners or consultants.

Black and Porter (2000:61) stated that:

“the history of management thought up to the end of the nineteenth century could be compared to a flowing river. In the centuries before the 1900s, there was a relatively tiny stream of ideas about how to manage organisations of any size and complexity. Like small brooks forming the source of a river, the ideas of ancient writers made their individual contributions to the development of management thought, but it was not until other events occurred, in this case the Industrial Revolution, that a major river was formed. The needs of expanding industrial societies provided the setting and impetus for concentrated attention on the subject of management. It took the exceptional efforts and dedication of a relatively small number of people to increase the flow of ideas.”

The obvious possible advantages of effective management initially raised very little interest. The first genuine interest in management occurred in 1911 with the publishing of Taylor's book '*Principles of Scientific Management*' (refer section 2.5.1.1 (b)). This event is traditionally considered as the beginning of management as a recognized field of scholarly inquiry.

The realisation that the systematic management of organisations could enable management to more efficiently realise its objectives developed from the mid-nineteenth century to the 1920s and first arose in America (Mescon et al, 1988:40). From thereon it gradually spread over the entire globe until all the major civilised countries in the Western world became part of it. The effects on the human race were difficult if not impossible to calculate.

Management did not become a recognised discipline until the early twentieth century. Some universities and colleges began to introduce and teach management topics relevant to the requirements of businesses at the time, Almost simultaneously most engineering schools started to introduce classes in specific selected management topics (Rue & Byars, 1989:42). Since 1950, the management discipline was recognised as an indispensable university subject (Cummings, 2002:12).

### **2.4.3 The management discipline**

From the foregoing it could be expected that management as a discipline would, as in the past, always be a major contributor to the future survival, development and prosperity of mankind. It is becoming more and more indispensable for success in the fierce competitive national and global environments. Organisational performance and success depend now more than ever before largely on the competency of management together with that of all the employees as a team in the organisation (Hodgetts & Kuratko, 1988:3). Without competent and energetic managerial leadership, production resources would largely remain production resources. With respect to the importance of the management discipline Drucker (1968:13) commented that:

“the emergence of management as an essential, a distinct and a leading institution is a pivotal event in social history. Rarely, if ever, has a new basic institution, a new leading group, emerged as fast as has management since the turn of this century. Rarely in human history has a new institution proven indispensable so quickly: and even less often has a new institution arrived with so little opposition, so little disturbance, so little controversy.”

Hodgetts and Kuratko (1988:4) advised that organisations must continuously strive to increase the managerial competencies of the work force. Management knowledge and competency increased tremendously over the last century and can be regarded as the single most critical factor for future economic progress. It can be said, with little ground for contradiction that due to the ever-increasing competition the entire free world has an immense stake in the competence of management (Farmer & Richman, 1965:1).

In this regard Drucker (2001:3) commented that:

“In less than 150 years, management has transformed the social and the economic fabric of the world’s developed countries. It has created a global economy and set new rules for countries that would participate in that economy as equals. And it has itself been transformed.”

Bateman and Snell (2002:32) implied that management, for thousands of years, experienced to some extent problems and issues of the same relative magnitude and complexity as those confronting the management of today. The magnitude and complexity of managerial problems will in fact increase exponentially with the increase in competition. The challenges to management will not disappear.

### **2.4.4 Management work**

Allen (1973:47-53) classified human work into management and technical work where he regarded technical work as the direct application of physical and mental effort to resources in order to secure

results by the person doing the work. Management work he defined as the application of mental and physical effort by a person in a leadership position to secure results through other people.

According to Allen a manager needs to always plan, organise, lead and control management and technical work. Hellriegel et al (2005:8) emphasised that all managers must capably perform the four basic management functions of planning, organising, leading and controlling on all the levels of an organisation. By this statement the authors admitted that all employees on all the levels of the organisation should in varying degrees perform these four managerial functions. Basically the essence of management work is that not only the managers but also all employees from the top man at the apex of the organisation down to the operators must perform management work in order to efficiently manage the achievement of the results required from each one of them and the organisation as a whole (refer sections 2.3.1 and 2.3.2). Logically then the ideal management method should accommodate this requirement.

#### 2.4.5 Management levels

As the organisations grew larger and competition increased mainly in England and the United States of America the number of supervisors and managers and levels had to increase. Also as the volumes of production increased greater supervision was required. The organisational levels of management depend on many aspects such as the type of industry, size of the organisation, geographical location and the competency and general management philosophy.

Donnelly et al (1987:23-26) related the strategic level to top management, the managerial level to middle management, the operations level to the first-line management, and the worker level representing all the so-called workers or operating employees (refer figure 2.4). These levels are to some extent general and could in the practical situation vary from organisation to organisation.

Top Management	Strategic level
Middle Management	Managerial level
First-level Management	Operational level
Operating employees	Worker level

**Figure 2.4: Managers and the levels of management**

Source: Donnelly et al (1987:23-26)

Generally the following three most common management levels are identified:

- Top management; consisting of the managing director or chief executive officer and several executive managers, who as a team, make up the management committee,
- Middle management; consisting of the managers responsible for the tactical management of the

organisation's departments, and

- First-line management; consisting of the managers responsible for the operational management of the sections of the organisation.

Management authors and practitioners proposed different sets of management level categories for different types of organisations. The main decisive criteria for the determination of the management levels of an organisation are the type of business, geographic location, size and organisational structural design. There is no general classification of the management levels in the literature. Some theorists claimed that the sophistication and improvement in managerial efficiency would increase with the improvement in technology. Kramer and Messick (2005:118) stated that twenty years from now a typical large business would have less than half the number of levels of management and less than one third of the number of managers than a similar organisation of today. Drucker (1968:36), on the other hand, argued that new technology would greatly extend the management area and as a result demand more managers.

#### 2.4.6 Managerial skills

According to Griffin (1987:21-25) and Massie and Douglas (1977:40-41) managers need specific skills in order to perform their work efficiently. Griffin (1987:24) identified and defined five skills applicable to management.

Conceptual skills	Conceptual skills	Conceptual skills
Interpersonal skills	Interpersonal skills	
Diagnostic skills	Diagnostic skills	Interpersonal skills
Analytic skills	Analytic skills	Diagnostic skills
	Technical skills	Analytic skills
	Technical skills	Technical skills
First-line management	Middle management	Top management

**Figure 2.5: Managerial skills at different organisational levels**

Source: Figure 1.5, Griffin (1987:24)



The skills as depicted in figure 2.5 are:

- technical skills for understanding and acquiring the necessary competency to accomplish specialised activities,
- interpersonal skills to efficiently interact with people from both inside and outside the organisation,
- conceptual skills to see the enterprise as a whole and to think in the abstract,
- diagnostic skills to analyse situations to determine the best course of action, and
- analytic skills in order to identify the key variables in a specific situation.

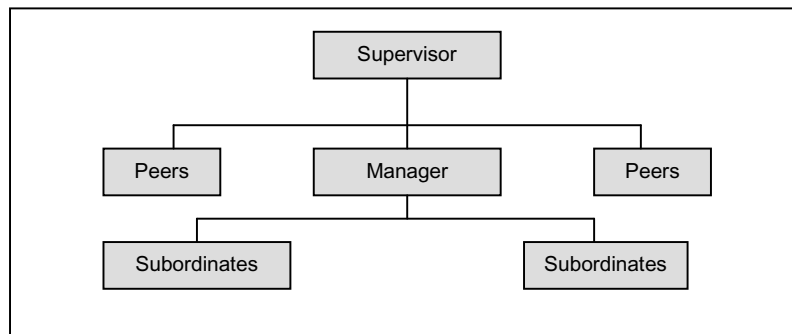
Merrill and Reid (1981:66) stated that analytical employees are inclined to make decisions on facts. In practice managers can not acquire everything of all these skills but should at least have an acceptable working knowledge of each and above all the competency to apply it efficiently at all times on all the levels of an organisation. Since managers are primarily responsible to deliver the results required from them through other employees they have to be competent in the work of managing. McDaniel and Gitman (2008:226) identified technical skills, human relation skills and conceptual skills.

The degree to which employees perform management work would vary from level to level but would increase as the employee progresses up the organisational hierarchy. It means that each manager and employee must be appropriately competent in the management work of planning, organising, leading and controlling at each specific level.

#### **2.4.7 Management roles**

Managers often fail to achieve the results required from them through others because they pre-occupy themselves with work that others should actually be doing for them. A manager must fully understand his role and position in the organisation with respect to the results required from him and delegated accountabilities. In practice people are mostly told what results are required from them – they are not necessarily involved in the planning of the results required from them (refer section 4.4.3). No literature could be found indicating how managers should logically determine their own work content or their ‘so-called’ core businesses as it is popularly referred to in practice. Job descriptions were very much products of personal efforts.

Allen (1973:44-45) was of the opinion that a manager has to content with four organisational interfaces (refer figure 2.6). These interfaces placed the manager in the unique position where only he had the objectivity, perspective and balance to satisfy the sometimes varying and conflicting needs of subordinates, peers and supervisors. The operator had to content with only three organisational interfaces. This concept is true for all employees from the highest to the lowest levels of the organisation and is essential for effective, comprehensive and integrated management for the organisation as a complete system.



**Figure 2.6: Multiple interfaces of a manager**

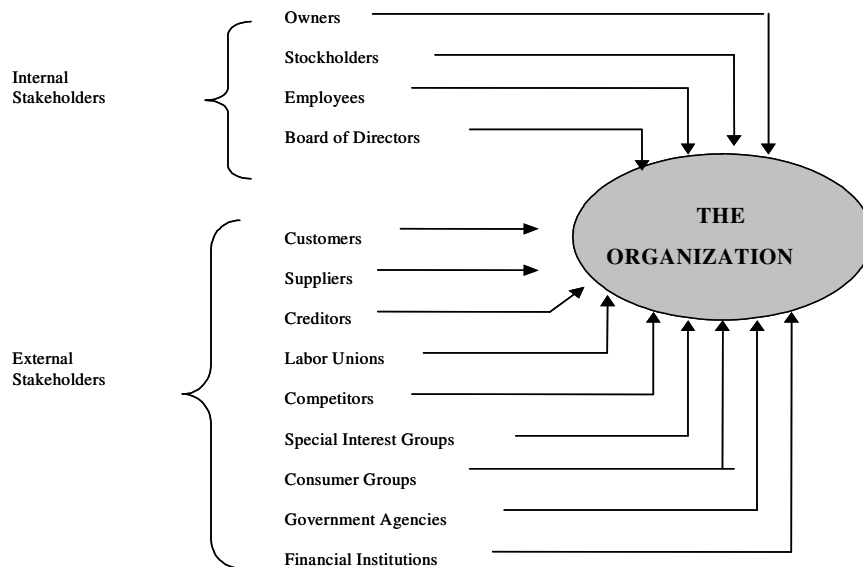
Source: Allen (1973:45)

The manager must realise that the results required by his supervisor are the sum total of the results that he will obtain from his subordinates and the contribution and participation and support from his peers, stakeholders and supervisor respectively. The results of the subordinates, peers, stakeholders and supervisor are directly and indirectly influenced by the manager's contribution. The results of each employee in the organisation must ultimately efficiently support the end result of the organisation.

#### **2.4.8 The environment in which management operates**

Businesses do not operate in a vacuum but in an environment that is dynamic and which has a direct influence on its performance (McDaniel and Gitman, 2008:34). One of the many phenomena that managers have to execute efficiently is change, either as a result of changed internal requirements or as a result of external circumstances. According to London (1988:15) change is a given fact in today's business organisations and the effects of it need to be taken fully into consideration when and where necessary. Organisations should anticipate and detect changes that could influence the operation of it or that may have any influence on it and the employees. Managers need to affect changes wherever and whenever it becomes necessary to the best interest for the company's continued optimal performance. Not all managers, however, have the skills to implement change and transform entrenched patterns of behaviour in an organisation (Backman & Butler, 2003:159).

Some innovative proposals, alterations or changes may be resisted merely because they may be perceived to require subordination of the organisation or the employees to the will of outsiders (Austin, 2002:424). The implementation of changes needs to be meticulously planned for with the total involvement of all the employees where applicable (Williams & Parr, 2004:65). According to Wegener et al (Knowles & Linn, 2004:13) the manager must communicate and coordinate the activities of the entire organisation and departments efficiently in order that it could successfully accommodate and adapt to all the influences of the internal and external environments. The responsibility of sound public and employee relations is imperative for the efficient operation of organisations and is the duty of management and of all stakeholders (Lamb & McKee, 2005:7).



**Figure 2.7: Environment influencing business**

Source: Hellriegel et al (2001:100)

Organisations operate within the boundaries of internal and external environments as illustrated in figure 2.7. According to Donnelly et al (1998:31) the internal environment includes the day-to-day forces within the organisation in which managers perform their functions, the external environment and all the forces acting on the organisation from the outside. Each of these environments has profound influences on the performance, results and survival of the organisation.

What is not reflected in figure 2.7 is that in the practical situation the organisation and all its subsystems are also interacting dependently on and with each other. An organisation also has an internal environment, which includes the elements within the organisation's environment, consisting of the current employees, management, stakeholders and especially the corporate culture. A change in any one of the subsystems or components may have an influence on the organisation and its components as a whole. If for example, in a continuous miner operation, a change in the type of the cutting picks or cutting cycle is introduced, it may well have an influence on the productivity, production and engineering cost elements of that section and could eventually impact on the total cost and productivity of the colliery as a whole. It would therefore be a decision affecting more than one employee, section or department on the mine. Also not indicated in figure 2.7 is that any system is closed, with inputs, outputs to the greater system and, very importantly, reporting systems from the output to the input in order to report and correct unfavourable deviations. Most, if not all, organisations operate in environments, which are defined by the most general elements in the internal and external environments and which are in continuous interaction and change (Bateman & Snell, 2002:47-57) and (Hussey, 1999:2-4).

According to Kottler (Howells, 2005:40) it has become more and more imperative for organisations to thoroughly investigate the external and internal environments that have or could influence it and its employees, suppliers, competitors, customers and potential markets. Environmental factors should be categorised, mainly in uncontrollable, semi-controllable and totally controllable factors. It is necessary in order that management can decide how it should manage the identified factors in order to optimise the viability of the business.

Management must create the means to timeously detect any changes and environmental factors that would or may have an influence on it or on a part of it. It needs to keep its fingers on the 'pulse' of the organisation at all times. The available literature and management practices did not mention or discussed the internal 'environments' which do exist within each employee's working boundary, section, department and the impacts of these environments horizontally and vertically in the organisation. The interaction is vital for sound delegation, communication, integration, coordination, control and optimisation.

#### **2.4.9 Management and stakeholders**

Some controversy exists as far as the concepts of share- and stakeholders are concerned. A shareholder can be defined as a person or entity either outside or in some cases inside the company with a financial interest, usually in the form of shares, in the company. Hussey (1999:32) and (Gaines-Ross, 2008:6) viewed stakeholders, as the shareholders of the organisation and not necessarily all are involved in and with the company. Stakeholders have the important responsibilities to link or contribute in the linking of the activities necessary to develop and realise the planned objectives of the organisation. All employees are stakeholders of the organisation because they each have an interest in the achievement of the results.

Carroll and Buchholz (2000:65) argued that:

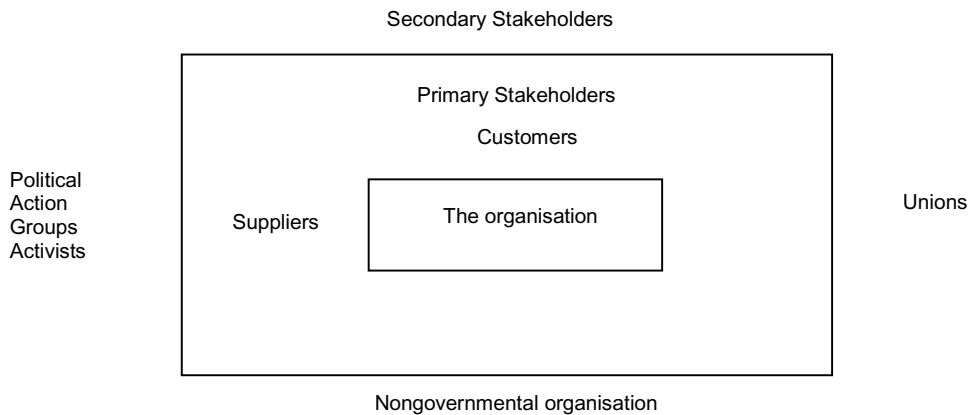
“a stake is an interest in an undertaking. The idea of a stake, therefore, can range from simply an interest in an undertaking at one extreme to a legal claim of ownership on the other extreme.”

Hellriegel et al (2005:165) defined stakeholders, as:

“Individuals or groups that have interests, rights, or ownership in an organisation and its activities are known as stakeholders.”

Campbell and Craig (2005:35) maintained that:

“A stakeholder can be defined as ‘any person or party that has an interest in, or is affected by, the activities of an organisation, however, strong or weak that interest may be. The interests of stakeholders may or may not be primarily financial in nature.’”



**Figure 2.8: Common stakeholders of organisations**

Source: Hellriegel et al (2005:166)

The controversy over stake and shareholders should not be seen as a serious problem. Each organisation should decide for itself how this issue should be dealt with within the organisation. The important fact is that due cognisance of the legitimate interests of stakeholders should be taken. They in effect have to interact and coordinate and integrate their activities with their stakeholders in order to optimise the performance of their sections or departments and that of the organisation as a whole.

Sound interaction and cooperation with stakeholders could be regarded as a sure recipe for continued success of the organisation. This fact is more often than not overlooked by many organisations. In fact it is sometimes regarded as doing stakeholders a special favour to involve them but in reality it is imperative to adequately involve every person that should make a contribution.

#### **2.4.10 Management as a profession**

From the literature it appeared that the majority of management thinkers lately began to recognise and accept that management is a full-fledged profession. According to Altman and Hodgetts (Mali, 1981:46) the management practice is both a science and an art. Establishing concepts and principles in practice reflects the science, and on the other hand the application of these concepts and principles in practice reflect the art.

From the views of Daft (2000:45) an occupation would qualify as a profession, if it:

- accumulates knowledge,
- requires competent application of the knowledge,
- accepts social responsibility,
- exercises self-control, and
- receives community sanction.

The management profession complies fully with all these requirements. Cronje et al (1987:21) concluded that management is a relatively young applied science that is concerned with the ways the enterprise could optimise its profit. It was and still is the only means of optimising company resources, increasing productivity and directing the company closer towards its goal (Goldratt, 1986:32).

When dealing with material matters, managers approached management as a science. At the lower levels of an organisation, managers, most of the time, applied scientific techniques. On the upper levels managers mostly applied judgment, thought and intuition. Successful managers on all the levels of the organisation need to employ both the art and science of management (Hodgetts & Kuratko, 1988:5).

Each practice has its own theory and therefore the management practice has its own theory. As an art, management requires the use of behavioural and judgmental skills that can not always be quantified or categorised in the same way that scientific information could be (Czarniawska, 1999:1). Management needs to acquire the art to 'read' each employee, simply because people are complex and different for a whole variety of legitimate reasons. Management is an art as well as a science because it requires the use of logic and analysis and it is a profession because it meets with the requirements of a profession.

Since management is the work that all employees have to do in order to obtain the most acceptable results all employees should acquire this proficiency. This would require that the theory should be logical, easy to comprehend and practical to apply. It would appear that existing management theories were not derived from a specific logic that would enable the organisation to manage comprehensively and practically from the top down to the bottom on all the levels of the organisation. In this thesis it had been hypothesised that such a management theory does not exist at present (refer section 1.5.1).

## **2.5 MANAGEMENT PRACTICES**

In this section a few of the most noted and practiced management approaches, techniques and programs, collectively referred to as management practices, were discussed and analysed. The objective was to determine whether they comply with the requirements of the comprehensive, practical and integrated management method and to what extent they could be utilised in the development of the theory for such a method (refer section 2.2.1).

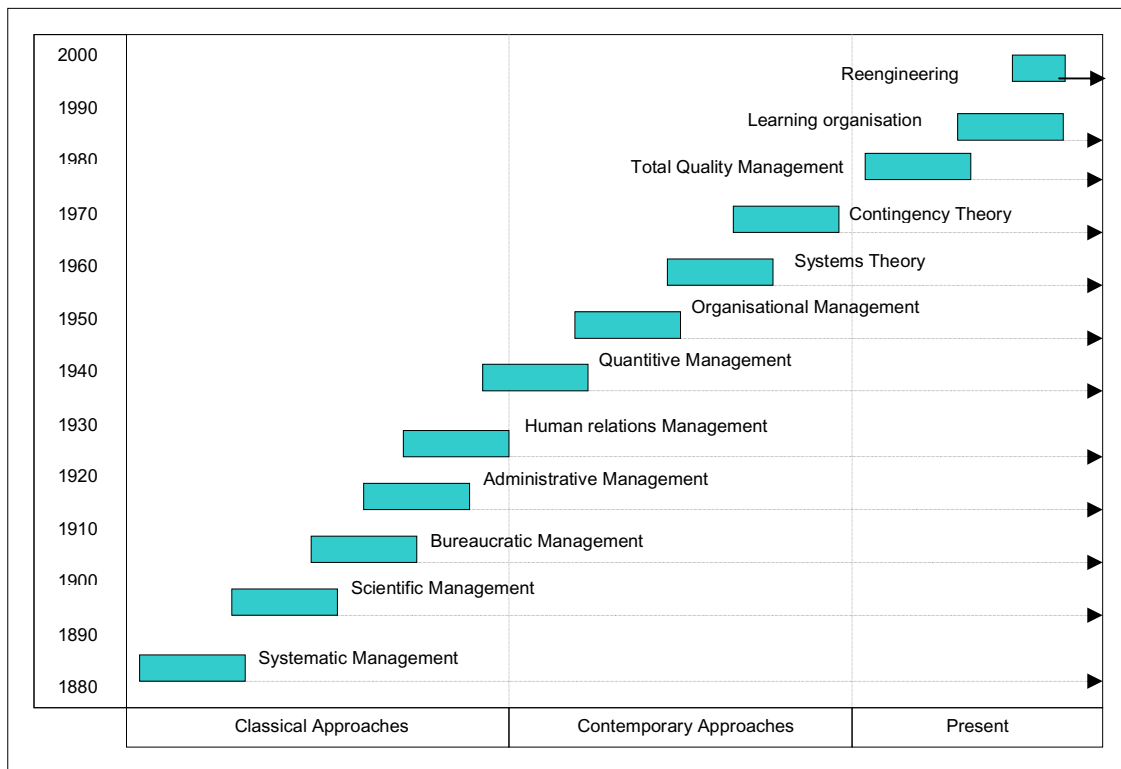
### 2.5.1 Management approaches

In this thesis a management approach was defined as a general overall method of management, which aims to enable all employees to manage comprehensively. Management approaches were developed over time and are relatively recent. From the literature it is evident that the development was as a result of a combination of trial and error, individual initiatives and organisational pressures and needs. The historical approaches were divided into the classical and contemporary approaches (Black & Porter, 2000:29-62). Bateman and Snell (2002:33-39) and Hellriegel et al (2005:36-62) gave a logical and understandable classification of the development of management approaches over the past 140 years that were briefly discussed in this section (refer figure 2.9).

Out of the great variety of ideas of how to improve management, parts of each approach survived and had been incorporated into modern perspectives on management. The emergence of the concept of economies of scale and the opportunities for mass production was initially created by the Industrial Revolution (1760-1830). This event came rather as a 'shock' to the management theorists and business organisations of that time. They were not ready for it and it resulted in intense and systematic thought about management problems and issues, particularly efficiency, production processes and cost savings.

Many of these approaches developed simultaneously, and often overlapped chronologically with the resulting impact on one another (refer figure 2.9). They were a direct reaction to the perceived deficiencies of previous approaches, needs and issues confronting management. All the approaches attempted to address the real issues facing the managers at the time and attempted to provide them with tools or some means to solve prevailing and future problems.

Although there existed a great number of classifications proposed by various management theorists this classification as proposed by these three theorists was accepted by the author of this thesis as the most logical and acceptable example for analytical reasons and further discussion. It reflects the most understandable, logical and progressive description of the development of management thought from the 1880s to the late 1900s.



**Figure 2.9: The evolution of management thought**

### 2.5.1.1 The classical management approaches

The classical management approaches developed toward the end of the nineteenth and beginning of the twentieth centuries. It emphasised a rational, scientific approach to the study of management and intended to convert organisations into efficient operating entities. The factory system that began to appear in the 1800s posed management challenges that caught earlier organisations totally by surprise which they could not have imagined previously in their wildest dreams (Daft, 2000:45). In short the businesses of the time were totally unprepared for the demands that faced them.

There were other management thinkers who were also thinking about how to manage organisations. According to Black and Porter (2000:43) the most notable among them were the Frenchman, Henri Fayol, Max Weber and the two Americans, D. Mooney and A. C. Reiley. Their ideas have come to be labelled as the 'classical management theory'.

The classical management theory focused on the study of the principles and functions of management, the authority structures of organisations, management of the total organisation and on ways and means to make organisations more efficient (Griffin, 1987:44-46). The systematic management, scientific management, bureaucratic management, administrative management and human relations management approaches were classified under this category. These approaches attempted to provide management with the necessary 'tools' to solve the problems at hand.



### **a) The systematic management approach**

The systematic management approach was developed during the mid-19th century. The objectives with this approach were to build specific procedures and processes into operations in order to ensure the coordination of effort. It emphasised economical operations, maintenance of inventories to meet consumer demand, organisational control and adequate staffing. At the time managers were mainly concerned with meeting the explosive growth in demand brought about by the Industrial Revolution, which required the optimisation of internal operations (Bateman & Snell, 2002:33).

i) The systematic management approach's main contributions were that it:

- initiated formal management in the United States of America, and
- promoted efficient, uninterrupted production.

ii) According to Bateman and Snell (1996:33) its main limitations were the ignoring of:

- differences in the views of managers and workers, and
- the relationship between the organisation and the environment.

As an approach it was a major improvement mainly directed at the optimisation of internal operations. It could be regarded as the first step taken into the still unexplored wilderness of the all-inclusive management ideal. It is in effect not a comprehensive management method.

### **b) The scientific management approach**

The growth in the number and sizes of factories, following the end of the American Civil War in 1865, caused increased attention to the issue of improving industrial efficiency (Black & Porter, 2000:37). A mechanical engineer, Frederick Winslow Taylor (1856-1915), generally regarded as the father of scientific management, developed the concept of a scientific approach to management in order to improve production processes (Hodgetts, 1981:8). It minimises wastage and inefficiencies at the operative level and maximises output with minimum effort (Rue & Byars, 1989:37).

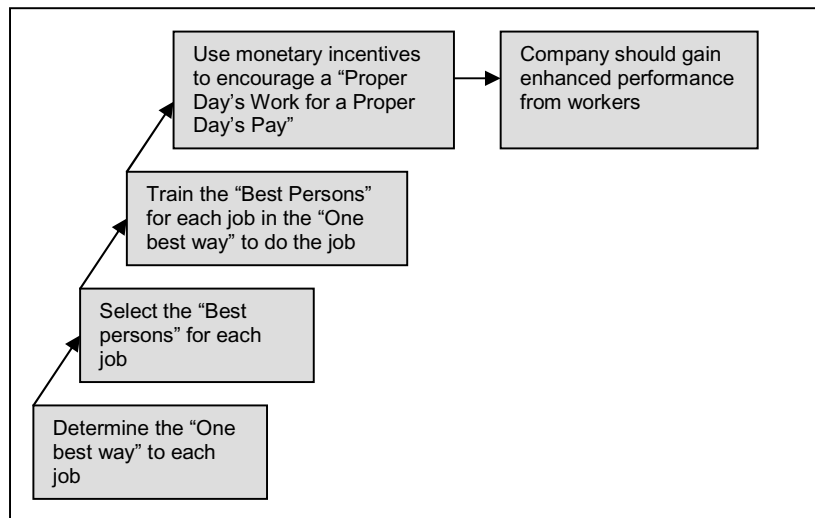
Scientific management utilised scientific methods in studying and analysing individual tasks and establishing optimal working methods and the associated performance standards to maximise efficiency (Holt, 1993:38) and (Ivancevich et al. 1997:36). According to Black and Porter (2000:38) Taylor's scientific management approach focused on a few key principles (refer figure 2.10). It is a sub-field of the classical management approach.

Basset (1993:6) summarised scientific management as a viable and relevant approach that:

- sets high specific performance standards, and
- selects the most suitable workers, and trains and pays these workers according to output.

Scientific management emphasised scientifically determined changes in management practices as the solution to improving labour productivity (Daft, 2000:46). It focussed on individuals and their machines or tools (Hellriegel et al. (2001:54). Taylor stated in his testimony in 1912 before the Special House Committee investigating the Taylor and other systems of shop management under the authority of the 'House Resolution 90' that scientific management was merely the equivalent of a labour saving device (Taylor, 1947, Testimony:15-16). It was a means of making men more efficient than they were at the present and that it was in accordance with Smith's philosophy that the division of labour had the potential to tremendously increase the productivity of labour (refer section 2.4.1). He claimed that the greatest permanent prosperity for the worker and the owner could be achieved when the work is performed with the least human and resources cost (1917:11).

To implement this approach, Taylor developed and used time and motion studies to determine the most efficient way to complete specific tasks and argued that management itself should change and the manner of change could only be determined by scientific studies. Peterson (1993:1) argued that although the scientific management approach was mainly applied on the shop floor there was no reason why it could not equally have been applied on all managerial levels to create the most efficient methods in planning.



**Figure 2.10: Basic elements of scientific management**

Source: Black and Porter (2000:39)

i) According to Mescon et al (1988:49) and Daft (2000:47) the main contributions of the scientific management approach were the:

- improved factory productivity and efficiency by gathering factual data concerning tasks and the introduction of scientific analysis into the work place,
- piece rate system equating worker rewards and performance,

- abandonment of haphazard approaches to planning and organising of work and the stressing of management's role in organising work, training workers and instituting incentives,
- instilled cooperation between management and the workers,
- demonstration of the importance of personnel selection and training,
- supporting of workers by planning their work and eliminating interruptions,
- provision of workers with the resources required to perform their tasks efficiently, and
- separation of planning and thinking from the actual work.

Taylor's discovery that work could be managed was a radical turning point in the thinking on the optimal utilisation of resources at the time. Although he never formulated his views into a theory the truth that productivity is the result of the application of the human knowledge to the work was never denied (Drucker, 1980:15).

ii) According to Bateman & Snell (2002:33-35) the main limitations of the scientific management approach at the time were that it:

- was too an authoritarian approach and places too much pressure on workers to perform,
- caused unfair division of rewards between management and labour demands and excessive specialisation of jobs and tasks,
- represented an oversimplified approach to worker motivation,
- paid insufficient attention to social factors in the workplace,
- affected worker behaviour,
- did not appreciate the social context of work and the higher needs of workers,
- did not acknowledge the variances among individuals,
- ignored the ideas and suggestions of the workers,
- made workers often felt exploited,
- ignored many job-related social and psychological factors by emphasising money as incentive,
- reduced production tasks to a set of routine procedures that led to boredom, apathy and quality control problems,
- was strongly opposed by the unions because they feared that management might abuse their power to set the performance standards and the piece-rates, and
- did not help managers to deal with broader external issues.

The scientific management approach made a tremendous impact and contribution to the productivity and profitability of organisations. It introduced the management functions of planning and controlling, the activities of cooperation, selection and training of personnel, coordination, and motivation at the worker level. It is still being applied today, mainly at the shop floor level. The main shortcoming was that it was not a total comprehensive management approach. It is perceived that it could to some extent be utilised in the development of the theory for a comprehensive, practical and integrated management method.

### c) The bureaucratic management approach

During the late 1800s, many European companies were managed on a 'personal' family-like basis. Employees were loyal to a single individual rather than to the organisation or its mission with the result that those resources were utilised to realise individual desires rather than to serve the customers (Daft, 2000:47).

Max Weber (1864-1920), a German theorist, envisioned organisations that would be managed on an impersonal, rational basis. It should rely on rules, a set hierarchy, a clear division of labour, and detailed procedures. The bureaucratic organisation emphasised management on an impersonal, rational basis through such elements as clearly defined authority and responsibility, formal record keeping and separation of management and ownership.

Bureaucratic structures can eliminate the variability resulting when managers in the same organisation have different skills, experiences and goals. Jobs are standardised to eliminate disruptions during personnel changes. One of the main benefits of this approach was that it enhanced the development of training schedules for the relevant employees.

i) The main contributions of this approach at the time were that it:

- promoted efficient performance of routine organisational activities,
- eliminated subjective judgment by employees and management,
- emphasised position rather than the person,
- provided a standard way of dealing with employees,
- facilitated developing of training manuals,
- enhance training of employees to act uniformly, and
- lead to improved company performance.

ii) According to Hellriegel et al (2005:43) the main limitations of the bureaucratic management approach at the time were that it:

- limited flexibility in organisational functioning,
- ignored the importance of interpersonal relationships and people,
- could sometimes lead to slow decision making,
- could become inappropriate with improvement in technology, and
- was difficult to dismantle once established.

This approach introduced discipline and order with specific procedures, policies and rules. It was used in this regard as part of the comprehensive, practical and integrated management method with the development of the most optimal tasks for each alternative method and the development of the supporting plans during the development and evaluation of the work tasks.

#### d) The administrative management approach

The systematic, scientific and bureaucratic management approaches mainly dealt with improving efficiency and productivity, specific job analysis, rules and procedures and stringent control on the lower levels of the organisation. They resulted in large increases in efficiency at the lower levels of the hierarchy. In order to take full advantage of these approaches organisations had to plan in more detail and involve all employees. According to Hodgetts (1981:10) managers realised that they knew very little about how to affect greater efficiency at the management levels.

The French mining engineer, Henri Fayol (1842-1925) is generally credited with as being the first scholar to present explicitly a functional analysis of the management process (Hodgetts, 1981:11), (Rue & Byars, 1989:48) and (Black & Porter 2000:44). He worked his way up to become managing director in 1888 of Comambault, the largest mining and metallurgical group in central France (Fayol, 1949:vi). He was the first to systemise the practice of management to provide guidance and direction to other managers. In his book '*General and Industrial Management*', published in 1949 by Pitman, he listed the five management functions of planning, organising, commanding, coordination and controlling (Fayol, 1949:43-107). His approach was known as the administrative or process management approach, which would appear to be the most widely applied management approach today (refer figure 2.11).

Fayol defined the five management functions as follows:

- Planning is examining the future and drawing up a plan to achieve organisational objectives.
- Organising is the building up of a structure to mobilise the materials and human resources to put the plans into action.
- Commanding is the giving of directions to employees to get them to perform the needed tasks.
- Coordinating is the unifying of the activities of employees toward realising organisational objectives.
- Controlling is ensuring that the objectives are realised according to the plans.

In addition, Fayol postulated the following fourteen principles or guidelines for efficient management (Fayol, 1949:19-42):

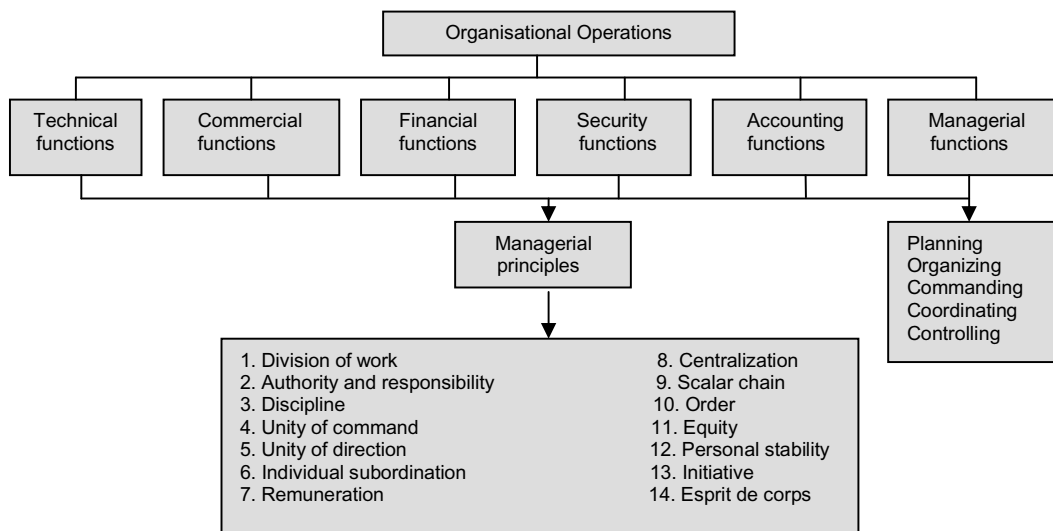
- "Division of work – divide work into specialised tasks and assign responsibilities to specific Individuals.
- Authority – delegate authority along with responsibility.
- Discipline – make expectations clear and punish violations.
- Unity of command – each employee should report to one supervisor only.
- Unity of direction – employees' efforts should be focused on achieving organisational objectives.
- Subordinating of industrial interests to the general interest – the general interest must predominate.
- Remuneration – systematically reward efforts that support the organisation's direction.

- Centralisation – determines the relative importance of supervisor and subordinate roles.
- Scalar chain – keep communication within the chain of command.
- Order – order jobs and material so they support the organisation’s direction.
- Equity – fair discipline order enhances employee commitment.
- Stability and tenure of personnel – promote employee loyalty and longevity.
- Initiative – employees to act on their own in support of the organisation’s direction.
- Esprit de corps – promote a unity of interests between employees and the customer.”

i) The main contributions of the administrative management approach were that it:

- viewed management as a profession,
- presented management as a process,
- maintained that management could be applied on all the levels of the organisation,
- believed that workers could be trained in the principles of management, and
- believed that managers could be trained in management theory.

ii) According to Bateman & Snell (2002:36) the main limitation was that universal prescriptions for environmental, technological and personnel factors needed qualification.

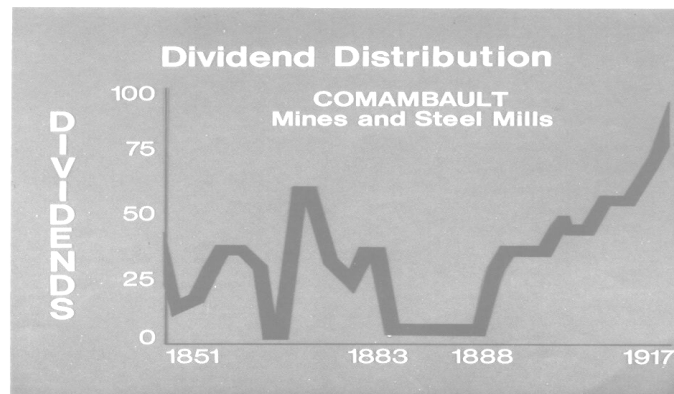


**Figure 2.11: Fayol’s managerial functions and principles**

During the late 1940s management thought in the English-speaking world began to move toward the idea of a process approach to management. It was only after Constance Storrs translated Fayol’s book in 1949 into English that the administrative management approach became known and available to the English-speaking countries of that time (Rue and Byars, 1989:48).

Lyndall Urwick was familiar with management theory literature on both sides of the Atlantic. In his book titled 'The Elements of Administration', he integrated the theories of Taylor, Fayol, Mooney, and other early management writers. He discovered many agreements between these early theorists. Because of his writings, it became evident by the early 1940s that the administrative theory was far more scientific, better researched, and more clearly understood than had previously been believed.

The application of his management approach as from 1888 enabled Fayol to turn the Comambault Mines and Steel Mills completely around from a serious loss situation into an extremely successful and profitable operation (refer figure 2.12). The administrative management approach focused on the total organisation. It was accepted by many organisations because of its functionality and applicability in general management applications. It is a process of management and explains managers' responsibilities and activities according to the managerial functions of planning, organising, leading and controlling (Holt, 1993:41).



**Figure 2.12: Dividend Distribution – Comambault Mines and Steel Mills**

Source: Leaders Guide, How to manage: The Process Approach and Henri Fayol, (1982)

It could be speculated that had Taylor and Fayol, as compatriots, met in real life a comprehensive, practical and integrated management method could have been developed more than one hundred years ago. The administrative management approach advocated that management is a process and in this respect it was utilised in the development of the theory of the comprehensive, practical and integrated management method. Crainer (1995:85) argued that:

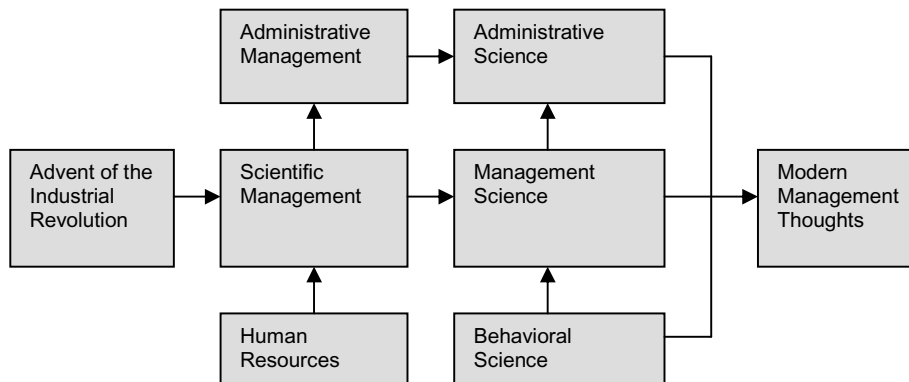
“The Frenchman Henri Fayol continues to be an under-estimated figure in the fledgling years of management theorizing. While the American Frederick Taylor gained attention (and later notoriety) for his ‘scientific management’, Fayol’s work is generally forgotten. Yet, Fayol pursued a much broader path than Taylor and his codification of what he thought management involved remains valuable.”

### e) The human relations and resources management approach

The humanistic perspective emerged around the nineteenth century. It was divided into the sub fields of: the human relations movement, human resources perspective and the behavioural sciences approach. The human relations movement emphasised satisfaction of the basic needs of employees as the key to increased worker productivity. It is based on the assumption that workers mainly respond to social needs and to a lesser extent to monetary needs (Black & Porter, 2000:53).

The human resources approach suggested that tasks should be designed to meet higher level needs by allowing workers to use their full potential. Two of the best-known contributors to the human resources perspective were Abraham Maslow and Douglas McGregor.

The behavioural sciences approach applied social science in an organisational context, drawing from economics, psychology, sociology and other disciplines. It emerged around the 1930s and endeavoured to understand how psychological and social processes interact with the work situation and influence performance. It stated that the key to increased worker productivity lies in the satisfaction of the basic needs of employees (Holt, 1993:43). It was the first approach, which emphasised the necessity of workers' satisfaction and higher performance in the operational situation through the implementation of informal work relationships (Ivancevich et al, 1997:39).



**Figure 2.13: The Emergence of modern management thought**

i) The main contributions of this approach were:

- that the reality of a hierarchy of needs was accepted, and
- management's acceptance that psychological and social processes influence performance.

ii) The main limitations were that:

- the simplistic belief that happy workers are always more productive is not always valid, and
- it was difficult to develop lower level employees to understand these concepts.



The scientific, administrative and human relations management approaches form the main pillars of the development of modern management and eventually resulted in what is today called modern management thoughts (refer figure 2.13). Although modern management thoughts, as we know it, are still not comprehensive, it formed a very important basis for the development of the comprehensive, practical and integrated management method. The systematic, scientific, bureaucratic and administrative management approaches were where applicable utilised in the development of the theory of the comprehensive, practical and integrated management method. The human relations and resources management approach would be used in the operation of the organisation once the comprehensive, practical and integrated management method had been implemented.

### **2.5.1.2 The contemporary management approaches**

The shortcoming with the classical management approaches was that even if used jointly they still had serious limitations. Industrial leaders required an approach or combination of approaches that would be comprehensive, practical and applicable on all levels. This need was, to some extent, addressed after World War 11 since military planners, when applying mathematical techniques out of necessity to defence and logistical situations, developed many new techniques. Business leaders felt that these techniques could be equally applicable in many situations in business areas. According to Bateman & Snell (2002:37) it represented the corner stones of modern management thought, attempted to overcome the limitations of the classical approaches and proposed relevant ideas for modern management.

The constituents of the contemporary management approaches were the quantitative management approach, organisational behavioural approach, systems theory, and the contingency management approach. Of these approaches mainly the systems approach was used in the development of the theory for the comprehensive, practical and integrated management method.

#### **a) The quantitative management approach**

This management science perspective is the application of mathematics, statistics and other quantitative techniques to solve managerial problems. It assists management in making decisions by developing formal mathematical models of problems (Holt, 1993:53). Techniques such as, management information systems, operations research, queueing theory and operations management were developed under this perspective (Daft, 2000:53-55). During World War 11, military planners began to apply mathematical techniques to defence and logistical situations. After the war, large organisations assembled expert teams to modify and apply these techniques in industrial situations (Bateman & Snell, 2002:37).

According, to Rue & Byars (1989:49) the 1950s saw a new era in the study of management. Production management and industrial engineering scholars began testing mathematical and modelling approaches

to quantify management problems and to arrive at more logical decisions. As a result, mathematical and decision theory schools of thought were developed for the study of certain management situations. The mathematical school viewed management as a system of mathematical relationships.

This era was followed by a period of attempting to integrate and rationalise the different theories and practices. The systems approach was one of the main and most meaningful management approaches that developed during this period.

The contingency approach was developed during the 1970s. Technological advances, especially, the rapid development in computer and programming technology facilitated and advanced the development of specific quantitative methods. These methods included techniques such as statistical decision theory, linear programming, queueing theory, simulation, forecasting, inventory modelling, network modelling and break-even analysis to name but some of many. The application of these techniques in the business sector is virtually unlimited.

i) The main contributions of this approach were that it:

- facilitated the development of specific mathematical methods to managerial problem solving,
- enhanced the development of sophisticated quantitative techniques to assist in decision making, and
- had been extremely useful in planning, controlling processes and assisting management in selecting the best alternative amongst a set of alternatives.

ii) The main limitations of this approach were that:

- it is not suited for non-routine or unpredictable management decisions,
- models tend to neglect non quantifiable factors, and
- managers, not trained in these techniques, may not trust or understand the outcomes of it.

The quantitative management approach could mainly be applied to quantifiable situations. It greatly simplified complex quantitative situations and hence enhanced improved decision-making. It would, be used in the optimisation of the various alternatives in the comprehensive management method.

## **b) The organisational behaviour and human behavioural management approach**

According to the organisational behaviour approach, human behaviour was much more complex than the theorists realised up to that time. Slowly it dawned upon them that organisational success was based on more than the satisfaction of social or economic needs (Bateman & Snell, 2002:38). Performance and satisfaction could be increased when employees are adequately trained and allowed to optimally utilise their talents and capabilities (Black & Porter, 2000:54). Organisational behaviour attempted to deal with the human aspects of organisations. It studied and identified the management activities which

would improve the effectiveness of employees through an understanding of the nature of individual, group and organisational processes (Hellriegel et al, 2001:59). It became one of the most important ingredients of efficient modern management.

i) In summary, the main contributions of this approach were:

- enriched jobs by increasing performance and autonomy,
- individual challenges, initiative and increased participation,
- the recognition of the importance of developing human resources,
- the provision of important insights into motivation, group dynamics and other interpersonal processes in the organisation, and
- that it challenged the view that employees were merely 'tools' instead of valuable resources.

ii) The main limitations of this approach were that:

- it ignored situational factors such as the environment and the organisation's technology,
- prediction of behaviour is not an exact science because of the complexity of individual behaviour,
- many managers were reluctant to apply some of the behavioural concepts, and
- not every practising manager properly communicated all the contemporary research findings.

The organisational behaviour and human behavioural management approach was limited to organisational and human behaviour. It could not be used in the development of the theory of the comprehensive, practical and integrated management method.

### **c) The systems theory**

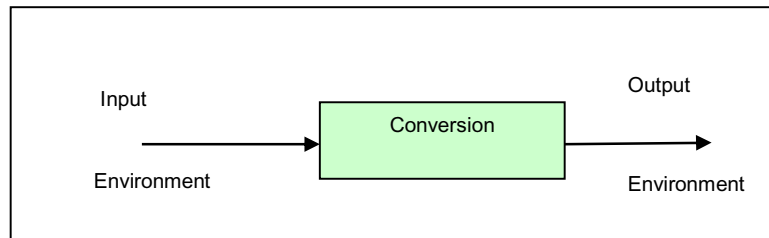
Management scholars, in the 1950s, attempted to analyse and understand the organisation as a whole and the different parts out of which it consists. It was found that the organisation, in reality, consists of many different dependent and interdependent systems and was a system in itself (refer figure 2.14).

According to Homans (1965:313) the employee in the group is firstly operating as an individual and secondly as part of the group. In this respect he is analogous to a cell in the human body. A closed system is completely self-supporting. An open system on the other hand does interact with its environment from which it obtains essential inputs for efficient functioning.

Senge et al (2001:90) viewed a system as a whole made up of a series of parts, which interact with each other. He defined a system as:

“a perceived whole whose elements ‘hang together’ because they continually affect each other over time and operate toward a common purpose.”

Most systems can be subdivided into sub-systems such as the production and marketing sub-systems. Further in this thesis it was proved that each of these sub-systems can further be subdivided into the most elementary systems and elements where an element is the smallest component of a system.



**Figure 2.14: Basic model of an open system**

The system's approach consists in recognising that if managers wish to understand the behaviour of anything that possesses the properties of a system, not only the part-part and part-whole relationships, but also the system's relationship to one or more larger systems should be studied (Amey, 1986:4-7). The General Systems Theory (GST) largely used in biology ('living systems') and engineering ('mechanical systems'), was developed early in the 1920s. This logic was also utilised in management.

Systems were generally defined as consisting of inputs into a process in order to produce outputs within the confines of a specific environment along with a feedback loop to measure and correct performance (Haines, 1999:19). According to Ziegenfuss (2002:11) management theorists began to realise that an organisation could also be seen as an open, sociotechnical system composed of a number of subsystems. It was only as recent as the 1960s that this approach was introduced to organisations (Black & Porter, 2000:57).

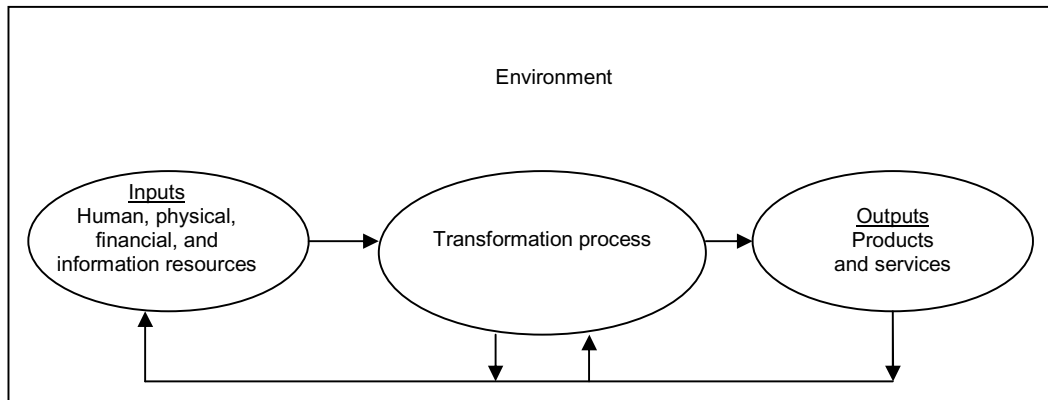
A process optimises results by converting inputs through a specific process into outputs Chase et al (2001:92). An organisation, its departments, sections and related processes are all systems that act interdependently and form part of the integrated whole. The organisation is a system in itself and if one part is changed, it can affect the rest of the organisation (Meredith & Mantel, 2000:6).

i) The main contributions of the systems theory were that:

- it views an organisation as a manageable system,
- management must interact with the environment to gather inputs and return the outputs,
- organisations contain a series of systems and subsystems which interacts,
- it recognises the importance of the internal organisation specific relationships, and
- it recognises the importance of the organisation's relationship with the external environment.

ii) The main limitations of the systems theory are that:

- it does not provide specific guidance on the functions and duties of managers, and
- not all employees understand and apply it.



**Figure 2.15: Basic systems view of an organisation**

Source: Hellriegel et al (2005:52)

The systems approach recognised the reality that organisations are made up of different interdependent subsystems such as departments, sections and operators and that each subsystem again is made up of smaller systems. It was used in this respect in the development of the theory of the comprehensive, practical and integrated management method.

#### **d) The contingency theory**

Management practices should be consistent with the requirements of the external environment, technology and the capabilities of the people involved in the organisation. Bateman & Snell (2002:39) stated that a variety of factors, both internal and external to the firm, might affect the organisation's performance. Therefore, there is still no best way to manage. Contingencies include circumstances in the organisation's external environment, the internal strengths and weaknesses of the organisation, the values, skills and attitudes of managers and workers in the organisation and the types of tasks, resources and technologies the organisation utilises. The manager should keep these contingencies in mind at all times.

i) The main contributions of this approach were that it:

- identified major contingencies, and
- argued against the generalisation of management principles.

ii) The main limitations were that:

- not all important contingencies can always be identified, and
- not all employees understood it and the theory may not be applicable to all managerial issues.

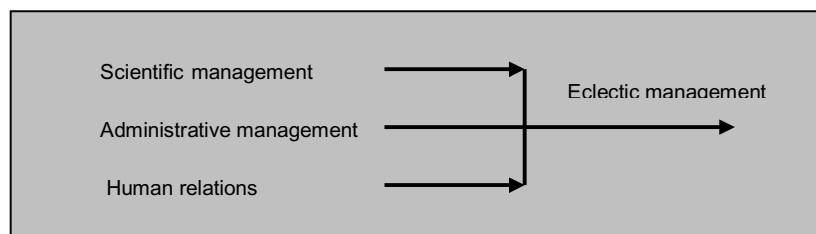
The contingency approach served the purpose of identifying major contingencies affecting the operation of the organisation. It, however, had a limited application potential and can not identify all contingencies. It was not used in the development of the comprehensive, practical and integrated management theory.

### 2.5.1.3 Evaluation of the management approaches

Initially there were no uniform organised methods of managing. Every business owner managed according to his best ability. It is likely that many owners and managers had their own preferential management styles, carry-overs from the past from generation to generation, and others were just not interested to learn from others, the not invented here (NIH) syndrome. It was possible that a great variety of inefficient management methods were the order of the day.

The systematic and bureaucratic management approaches served mainly to bring order, direction and control to basically haphazardly managed organisations. Scientific management concentrated on increasing productivity, especially on the shop floor. The administrative management approach led management to become primarily concerned with identifying and refining the functions or components of the management process and was concerned with the functions of management. According to Hodgetts (1981:18-20) the scientific managers, administrative managers and the behaviourists all contributed important ideas to modern management. The scientific managers arrived on the scene around the 1880s, the administrative managers came along around the 1920s and the behaviourists began to emerge during the 1930s. The thinking of each contributed to the understanding and application of management to the extent that present management practices could be seen as a combination of all the management approaches.

The classical and contemporary management approaches made a major contribution in the designing, developing and applying of new management techniques. It provided valuable and indispensable management techniques and practices to management to improve productivity, human and social relations and the identification of contingencies. The classical and contemporary management approaches' major deficiency, however, was that they still failed to provide specific guidance on the comprehensive application of a comprehensive, practical and integrated management method that could be applied efficiently by all employees on all the levels of all organisations.



**Figure 2.16: Development of management approaches**

The thinking of each contributed to the understanding and application of management in so far as that present management practices could be seen as a combination of all the management approaches. This led to a management method called eclectic management, which meant that the management of the time used a combination of the best of what was available and let the rest go (refer figure 2.16).

#### **a) Classical approaches**

i) The main contributions of the classical approaches were that they:

- promoted efficient, uninterrupted production and improved factory productivity and efficiency with the introduction of scientific analysis into the work place,
- stressed the role of management in organising work, selecting, training workers and instituting incentives,
- stressed the importance of the administrative management approach, and
- eliminated subjective judgment and promoted efficient performance.

ii) The main limitations were that:

- they were more appropriate for stable and simple organisations than for today's dynamic and complex organisations,
- they did not provide for comprehensive and integrated management,
- they often prescribed universal procedures that are not really appropriate in some settings,
- they did not provide specific guidance on the functions and duties of managers, and
- many managers still view employees as tools rather than valuable resources.

#### **b) Contemporary approaches**

i) The main contributions were that they:

- facilitated the development of specific mathematical and quantitative methods and techniques to managerial problem solving and decision-making,
- recognised the importance of developing human resources,
- furthered the belief that employees are valuable assets,
- recognised the importance of the systems concept,
- recognised the organisation's relationship with the external environment, and
- identified major contingencies.

iii) The main limitations were that:

- models neglected nonquantifiable factors,
- some approaches ignored situational factors such as the environment and the organisation's technology,

- they did not provide specific guidance on the functions and duties of managers,
- they did not provide for comprehensive and integrated management,
- in some situations they were difficult if not impossible to implement,
- they can not guarantee that all important contingencies could be identified, and
- the theory may not be applicable to all managerial issues.

The classical and contemporary management approaches provided valuable and indispensable management techniques and practices to management to improve productivity, human and social relations and the identification of contingencies and problem solving. Their major shortcoming was that they did not provide specific guidance on the functions and duties of managers and specific guidance on the application of a comprehensive, practical and integrated management method.

### **2.5.2 Management techniques**

In this thesis a management technique is defined as a deliberate effort or input of relative short duration, a program introduced with the aim to either introduce, update or improve specific management decisions or performances such as safety, cost, human relations, zero based budgeting or activity based management to name but a few. Many management techniques emerged over the decades; all because of the need to supply much needed management input in order to supplement the still incomplete management practices. Many management techniques disappeared since and new ones appeared and many more would continue to appear in the future. A few were discussed here in order to reflect the general nature of these techniques and their applicability for developing the theory of the comprehensive, practical and integrated management method.

#### **2.5.2.1 Total quality management**

The total quality management (TQM) concept was based on the work of W. Edwards Deming (Statt, 1999:138). TQM is a process and a set of techniques whose total application results in customer satisfaction (Delener, 1999:151). It focused on customer satisfaction through managing the total organisation to deliver the required quality of products and services to the customers.

Chase et al (2001:260) argued that the entire organisation must excel on all dimensions of products and services that are important to the customer. Quality was regarded as a critical aspect of the management function and can not entirely be left to operators (Madu, 1993:3-5). The four significant elements of TQM are:

- the focus of customers,
- the involvement of all employees,
- benchmarking, and
- continuous improvement.



According to Feigenbaum (Christopher & Thor, 1993:2-1.3 – 2-1.10) TQM requires top management's commitment and includes the total quality of products as well as the total commitment of all the business management processes. Quality management must be seen as a customer-driven approach to quality. The enterprise must continuously improve the quality of services.

### **2.5.2.2 The learning organisation**

According to Hodgson (Crainer, 1995:691-700) the learning organisation was a popular management technique. It was extensively used by many organisations.

Hellriegel et al (2005:343) argued that:

“A learning organisation has both the drive and the capabilities to modify or transform it and improve its performance continuously.”

#### **a) Characteristics**

The learning organisation is characterised by:

- i) a visionary leadership,
- ii) a team-based structure and a participative strategy,
- iii) a strong adaptive culture,
- iv) a high degree of participation and morale,
- v) employees that are fully empowered,
- vi) employees feeling that they are making valuable contributions,
- vii) the organisation realising that it has more and more a wealth of experience and skills,
- viii) mutual respect and people treating each other as coequals, and
- ix) people venturing freely to experiment, take risks and openly discuss the results. No one is penalised for making a mistake (Senge et al, 2001:51).

#### **b) Systems thinking**

Senge (1990:5) argued that the learning organisation is distinguished from the traditional organisations by its emphasis on mastery of certain basic principles. It actually utilises systems thinking in developing the learning organisation.

Systems thinking could not work successfully without:

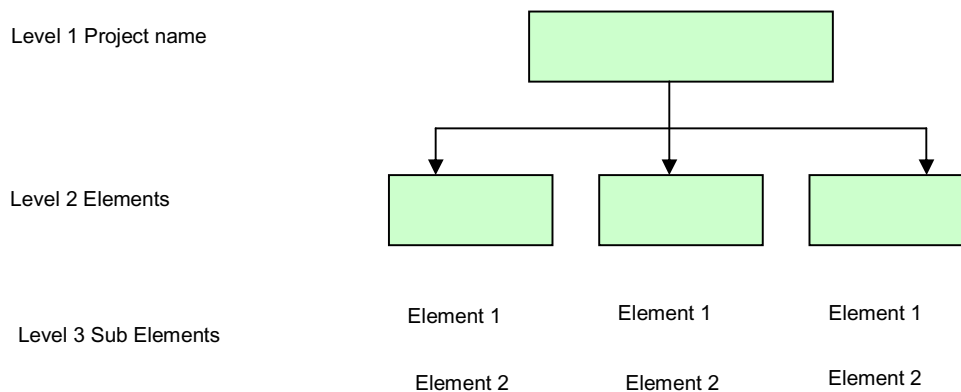
- i) building a shared vision which fosters a joint long-term commitment,
- ii) mental models which focuses on the openness required to solve deficiencies in the present ways of seeing the world, and

iii) team learning which develops the skills of groups to identify the reasons of what lies behind individual employees' perspectives.

### 2.5.2.3 Work breakdown structures

The technique of Work Breakdown Structures (WBS) was normally used in developing a framework to organise the work, establish effective means for communication, costing, and control purposes for projects (Haugan, 2002:1-6). It is a quick technique but it is in no way a comprehensive method. It does not follow a definite logic.

#### a) Development of the WBS



**Figure 2.17: Example of a work breakdown structure (WBS)**

In the development of the WBS the following steps were used:

- i) specify the project objectives with specific focus on the products, services or results to be provided,
- ii) identify the products, services or result deliverables or end items to be provided to the customer,
- iii) identify other work areas in the project to make sure that all the work is covered,
- iv) identify areas that represent intermediate outputs, or complement the deliverables, and
- v) subdivide each area into successive steps and logical subcategories until the complexity and money value of the elements become manageable units for planning and control purposes.

#### b) Content of the WBS

The content of the WBS will vary from project to project depending on the:

- i) size and complexity of the project,
- ii) structure of the organisations involved,
- iii) phase of the project,

- iv) project manager's judgment of work allocation to subcontractors, and
- v) degree of uncertainty and risk involved.

Once the WBS for a project was established, it has to be maintained. It has to be updated to reflect any changes in the project. The WBS was considered as a tremendous communication tool to present the project's scope in an understandable format. At the end of the planning phase, the plans and schedules were frozen or 'baselined' and became the basis for executing the work of the project. At the same time, the WBS became one of the key mechanisms for change management.

Proposed work not in the WBS needed to be added to the project and to the WBS through formal change control processes. For any change in the required results or influences of factors outside the organisation the existing WBS model needed to be adjusted or revised.

The WBS was not developed from a specific management logic but was rather based on a set of rules. It can not in any way be regarded as a comprehensive, practical and integrated management method. All employees on all the levels can not apply it uniformly in all organisations. The development of it would be very much dependent on the practical experience, competency and commitment of the specific employee.

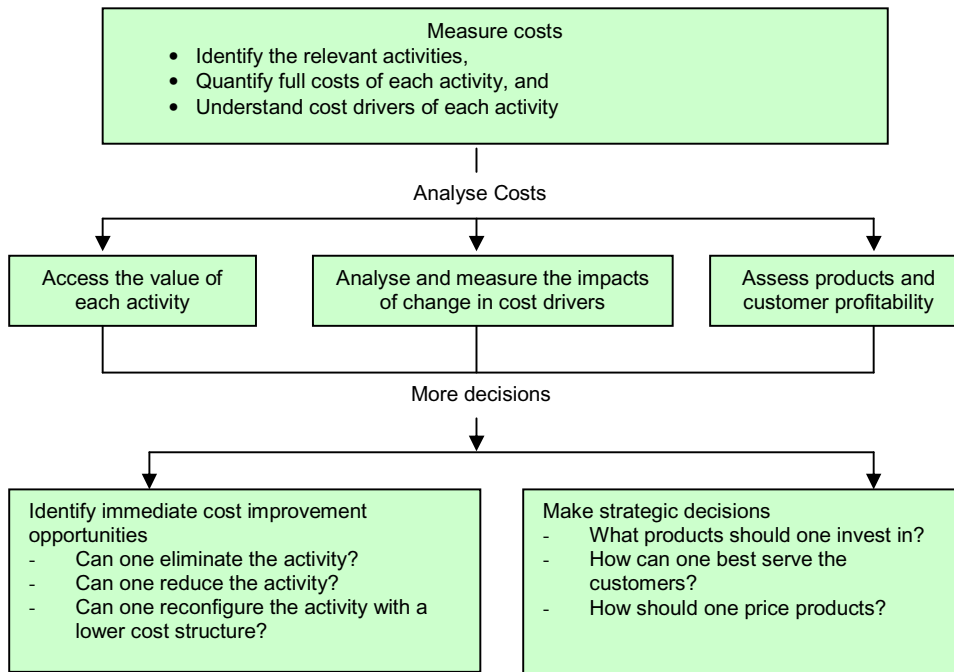
#### **2.5.2.4 Activity-based management (ABM)**

Activity-based management is the implementation of activity-based costing by the management of an organisation. It is a set of analytical tools or method that assists management to make a wide range of decisions in maximising value from operations (Statt, 1999:3). This technique concentrated on the cost aspects only and unfortunately does appeal very strongly to executives with the overriding desire to reduce costs and maximise profits at all cost over the short term. The inherent danger with this technique was that it was not developed from a logical step-by-step work flow development point of view. It was not necessarily a pure objective focused technique. It can, therefore, do more harm than good. It concentrated mainly on the cost aspects of activities or work steps and ignored the validity of these activities in terms of the pursuit of a predetermined objective. It would appear that the activities analysed were normally not derived from a step by step development of work required to realise a legitimate objective but just analysed existing unscientifically determined activities.

The practice of concentrating primarily on the cost aspects only may result in:

- a) the danger of just only keeping on financially controlling an ineffective system, which could over the long-term nullify all existing advantages without management really appreciating it,
- b) that 'career-chasers' may use it to further their own interests,
- c) the danger of neglecting necessary work over the long term,
- d) the possibility that many tasks could have been omitted from the work method in the first place,

- e) the possibility that the working method is not necessarily, from a management point of view, the best and scientifically designed method, and
- f) that adjustments may be cumbersome and as such sometimes neglected.



**Figure 2.18: Example of activity-based management**

#### 2.5.2.5 Evaluation of the management techniques

The management techniques, similar to the management programs, dealt each mainly with one or a few management activities or aspects only. They were by no means comprehensive but were intended to serve a specific purpose. Most, if not all, organisations use some or combinations of these approaches, programs and techniques. The real shortcoming was that, whether in a combination or not it still did not constitute a comprehensive, practical and integrated management method. They were popular as quick fixes by many managers who easily fell for the bestseller advertising campaigns. These techniques were without exception single topic attempts to address prevailing management issues. They were not products of comprehensive research. They seldom lasted for extended periods. Above all they were not comprehensive from a management point of view.

#### 2.5.3 Management programs

A management program is a management practice, which is directed at the introduction or improvement of a specific management function or skill such as communication skills, negotiation skills, motivation skills or other. A great number of short single-topic-focused management programs were developed

over the past 60 years, specifically to serve identified needs at the time and to overcome the deficiencies of existing management approaches.

Mali (1981:28-46) described a number of, what he termed, practice management strategies defined as preferred ways of managing. Practitioners developed these by way of selecting and synthesising what they felt they needed from knowledge, technologies, attitudes, doctrines, theories, methods and existing proven practices. These preferred ways of managing were developed over time to supplement the existing incomplete management practices.

Ten out of many of these programs were briefly described to illustrate the point that each of them was developed to serve the need of a single or a small number of management deficiencies only. They were developed as specific needs arose and served the management discipline at the time. Many of these had since become obsolete and disappeared from practical use. They were by no means the solution to a comprehensive, practical and integrated management method.

### **2.5.3.1 Managing by objectives (MBO)**

Managing by objectives emphasises the importance of setting objectives for and by each individual member of a section, department or an organisation as a whole (Statt, 1999:99). The purpose is to set and pursue realistic attainable objectives.

Austin (2000:12) defined management by objectives as:

“an effects-oriented process for developing what is essentially campaign ‘recipes’.”

It is a practical way to ensure the planning for results by all members of management and to establish controls in an environment of individual freedom. When all management levels participate in establishing the strategy, a system emerges in which key individuals move in a given coordinated direction.

Objectives tend to be improvements that supervisors and managers want to initiate in their areas of responsibility and accountability. Peters & Waterman (1982:13) commented that their research proved that the excellent companies were, above all, brilliant on the basics; tools did not substitute for thinking, intellect did not overpower wisdom and analysis did not impede action.

Hellriegel et al (2005:389) defined management by objectives as:

“a participative goal-setting technique used in many U. S. organisations.”

a) The benefits of MBO are that it can result in:

- i) large-scale achievement of results in the organisation or part of it within a specific time limit,
- ii) the institution of coordination and control in the specific department or section in an organisation,
- iii) clarity of the performance-contribution-reward process, and
- iv) increased motivation to complete commitments with an existing style.

b) The disadvantages of MBO are that:

- i) unforeseen circumstances can disrupt the pursuit of objectives, for the duration of the application of it, and
- ii) it closes the door on any new opportunities or resources.

This program formed and still forms a valuable part of productivity improvement campaigns of many organisations, especially, in the western world. It is not a comprehensive management method. It concentrates, as the name implies, on a concerted drive on objective setting in a section or department and the realisation of these objectives.

#### **2.5.3.2 Managing by exception (MBE)**

Managing by exception is a control strategy that enables managers to concentrate on problems and opportunities that need their direct attention and avoid dealing with those that could be handled by subordinates. Managers set up reporting systems that would signal when their attention and involvement are needed. The reporting systems indicate no action when subordinates are completing expectations according to standards or plans.

Many activities are reduced to measurable standard practices, so that the manager could mainly handle genuine emergencies. Statt (1999:98) defined management by exception as managerial control that requires subordinates to inform supervisors only when something happens which is sufficiently exceptional to require their personal attention. Managers should not just add on their responsibilities but should only perform tasks that contribute to the achievement of their delegated results.

a) The benefits of MBE are that it:

- i) allows the manager to manage from a distance and releases more personal time for him,
- ii) introduces the management activities of delegating, controlling and setting of performance standards,
- iii) focuses on the use of standards in judging performance and people,
- iv) reduces significant fluctuations in work situations which strengthens predictability of results,
- v) makes fuller use of competent and highly paid workers, and
- vii) provides a channel to screen the daily flow of information requiring a manager's attention.

b) The disadvantages of MBE are that:

- i) it requires a comprehensive observation and reporting system,
- ii) it can give a false sense of security when no variances are reported, and
- iii) it requires special skills to set and write measurable standards.,

This management program has the benefit that it forces the management to set performance standards, delegate to subordinates and act when a deviation requiring attention is reported. It also emphasises the need for an efficient reporting system and immediate correction. It is, however, concentrating mainly only on the three management control activities of setting performance standards, delegating and reporting by exception.

MBE does not commence from an objective directed analysis based on a logical management logic. The control standards therefore are not necessarily legitimate in a specific instance and the perceived corrective action may not result in optimal performance. This principle could therefore only be applied in situations where the work and performance standards are correctly developed.

#### **2.5.3.3 Managing by decision models (MBDM)**

Managing by decision models is a quantitative strategy testing variables by comparing alternatives. It facilitates decision-making by constructing or simulating situations in such a way that the variables could be tested as to their effects when changes are made. These simulated or represented situations are termed models.

A model can be manipulated or analysed more easily at relatively lower costs than the real situation, which permits the manager to carry on with experiments. The models are manipulated so that conditions are maximised or minimised. They could consist of many types of models such as physical, analogue, probability-verbal, schematic and mathematical models.

The specific model selected must best serve the specific management aspect or problem.

a) The benefits of decision modelling are that it:

- i) explores maximum and minimum limits with respect to costs, time and technical performance without changing the real situation,
- ii) determines the effectiveness of various methods through a test or dry run in the model,
- iii) provides rational ways to deal with uncertainty, risks and prediction of outcomes, and
- iv) assists to define major and minor problems in complex situations and a way to test the outcome of a decision through simulation and manipulation before implementation.

b) The limitations in model use are that:

- i) many variables of a real situation are nonquantifiable in cause-effect relationships,

- ii) the model tends to be an oversimplification, and
- iii) the cost of developing and validating the model could be high could be sometimes excessive..

This management program endeavours to improve performance results by concentrating on simplifying and improving decision-making. It introduced the utilisation of models in order to evaluate alternative methods. This aspect was used in the development of the theory of the comprehensive, practical and integrated management method.

#### **2.5.3.4 Managing by styles (MBS)**

Managing by styles is a strategy of selecting a leadership role that would best influence the people within a certain situation. The role is a collection of perceptions, orientations, concerns and attitudes that would 'best fit' the needs and relationships of the members of the group and their responsibilities for completing work. Because situations and groups differ, many styles are possible. The effectiveness of some styles resulted in them being used more than others.

a) The benefits of managing by styles are that it:

- i) provides the required leadership to make a group operational in a given situation,
- ii) enables the building of teamwork among people who have never been part of a team,
- iii) enables subordinates to behave in a desired manner, and
- iv) provides a means to enhance some form of flexible management.

b) The problems with managing by styles are that:

- i) difficulty may be experienced to change an originally effective style when the situation changes,
- ii) all persons are not susceptible to changed styles,
- iii) it may be difficult and time consuming to change to the appropriate style, and
- iv) it is play-acting on a one-stand basis in its lowest form.

Managing by styles provided a simple but effective way of changing existing styles or introducing new effective styles. It was however concentrating only on human behaviour, one of many aspects of the management discipline and was not utilised in developing the comprehensive management theory.

#### **2.5.3.5 Managing by competitive edge (MBCE)**

Competition in the market place is well appreciated and understood by organisations that are motivating customers to buy their products. Managing by competitive edge concentrates on the rules of competition among departments, groups and individuals. It is a silent form of competition. Those who practice in it know that the potential advantage or edge an individual, group, division or organisation can obtain over colleagues and coequals can be a powerful means for advancement, growth and rewards. MBCE begins



with a careful assessment of the performance of rivals, behaviour and contributions of colleagues, partners and organisational counterparts. The practitioner proceeds to determine the level, type and amount of performance needed to operate with an edge over his rivals.

a) The benefits of MBCE are that:

- i) visibility of performance is obtained by practitioners within the organisation, and
- ii) ambitious practitioners bent on rapid advancement can utilise this program.

b) The disadvantages of MBCE are that:

- i) it could disrupt vitally needed cooperation in projects or coordinated undertakings, and
- ii) it tends to favour aggressive personality types.

This program served to enhance excellence in the organisation. Like the previous programs it was only concentrating on one of the many aspects of management. It was not utilised in the development of the comprehensive, practical and integrated management theory.

#### **2.5.3.6 Managing by coaching and development (MBCD)**

Managing by coaching and development is a strategy with the aim to develop the knowledge and skills of the employees. It is a very important constituent of sound management and should as a rule be part of the normal operation of any organisation. Subordinates can acquire valuable knowledge from experienced supervisors with this program. Tasks, work assignments or projects are selected in order of increasing difficulty and then delegated to the employee. The systematic improvement in knowledge, skills and attitudes required is then attained through concerted teaching and coaching.

a) The benefits of MBCD are that it:

- i) enhances achievement of higher level performance in developing potential and talent,
- ii) ensures that knowledge and skills that satisfy individual needs remain up to date, and
- iii) increases motivation through the increased developmental attention.

b) The disadvantages of MBCD are that:

- i) personality traits may seriously hamper coaching and training,
- ii) it could damage morale,
- iii) it could cause dissatisfaction due to over training, and
- iv) coaching and development can often be difficult if not impossible.

The managing by coaching and development program is an excellent program to improve performance, provide managerial succession and to develop individual talent, knowledge, skills and motivation. For this reason it would form part of the comprehensive integrated management method.

### **2.5.3.7 Managing by information systems (MBIS)**

Managing by information systems ensures that information centres are developed for deliberating, generating, distributing, storing and returning information needed across disciplines, functions and departments. It ensures that information needed by decision-makers is timeously available.

a) The benefits of MBIS are that it:

- i) establishes the information interrelations that exist among departments,
- ii) gives a better prediction of the effect of an action or change on everyone, and
- iii) enhances sound decision making.

b) The disadvantages of MBIS are that:

- i) designing a complete information system is a complicated and expensive task,
- ii) a time lag exists between data generation and end-use information,
- iii) information centres do not coincide very often with departmental centres, and
- iv) skills and technical know-how for the design and development of MBIS are not found frequently in organisations.

This program provided effective communication. It would prove to be automatically an outcome of the development of the comprehensive, practical and integrated management method.

### **2.5.3.8 Managing by matrices (MBM)**

Managing by matrices was a useful practice in a wide variety of management approaches in obtaining results. This approach establishes relationships in tabular form so that analysis and decision-making is simplified.

a) The benefits of MBM were that it:

- i) clarified many cause-effect relationships operating in complex processes,
- ii) allowed exploration of the minimum and maximum limits by manipulation of quantitative relationships,
- iii) enabled these quantitative relationships to be identified for study and analysis, and
- iv) helped management visualise extensive components involved in a situational problem.

b) The disadvantages of MBM were that:

- i) it was an oversimplification to consider relations one-over-one,
- ii) not all relationships were quantifiable,
- iii) not every employee would understand and utilise this program,
- iii) solutions were at best approximations, and
- iv) if more than two variables were involved, assumptions of two-dimensional analysis fall apart.

Again as in the previous programs discussed this one was also only providing in one of many management aspects. It was not utilised in the development of the theory for a comprehensive, practical and integrated management method.

#### **2.5.3.9 Managing by work simplification (MBWS)**

Managing by work simplification was a process of study and analysis to discover simpler and more effective methods of accomplishing work. The study usually resulted in changed methods of work for the purpose of lowering costs, improving productivity or bettering the quality of output. It leads to the achievement of higher productivity levels.

a) The benefits of MBWS are that it:

- i) leads to direct labour and material savings,
- ii) improves morale motivation,
- iii) simplifies work processes, and
- iv) justifies issuance of new policies in the work situation.

b) The disadvantages of MBWS are that:

- i) job classifications and pay scales make it difficult to use it in union-connected organisations,
- ii) it creates defensiveness on the part of superiors whose work situations were to be studied,
- iii) it requires a great deal of paper work for analysis and plans for implementation, and
- iv) it lacks motivational inspiration.

This program can be related to the scientific management approach. If applied in this context it may result in considerable savings and motivation but is in no way a comprehensive method.

#### **2.5.3.10 Managing by organisational development (MBOD)**

Managing by organisational development was a formal practice for designing and implementing plans to assist the members of an organisation to interact more efficiently in their pursuit of objectives. This practice required one or more change agents whose job it was to assist the organisation in creating conditions for change.

a) The advantages of MBOD are that it:

- i) is aimed at the development of the organisation as a whole,
- ii) recognises that the most important changes could be made with people in groups,
- iii) creates much needed openness in cooperation,
- iv) develops collaboration and trust, and
- v) clarifies verbal and nonverbal types of communications.

b) The main disadvantages of MBOD are that:

- i) habits of people can make change difficult,
- ii) implementation is expensive,
- iii) implementation often requires help from outside,
- iv) many interventions are still unproven and experimental, and
- v) supervisors need special training.

This program, in itself, can only serve a specific purpose. It was not utilised in the development of the theory of the comprehensive, practical and integrated management method. It would come out as part of the development of the theory.

#### **2.5.3.11 Evaluation of the management programs**

In summary the programs served one or at the most three management aspects each, and even when combined, constituted in no way a comprehensive, practical and integrated management method. Furthermore they should be used with the utmost care and strict control as some of them, if not judiciously used, could be counter-productive to the morale and performance of the organisation.

#### **2.5.4 Ubuntu; an African management philosophy**

Ubuntu, a much acclaimed African philosophy and lifestyle, is regarded by many leading black people in Africa as a management method or approach which is more and more seen by them as a means of solving mankind's existing problems. Many black people are convinced that it would be the best substitute for the modern capitalistic driven western management approaches.

In real life one does not see the manifestation of this philosophy. It is difficult if not impossible to detect any compliance with the core values of the Ubuntu philosophy (refer table 2.1). Some black people strongly advocate the institution of this philosophy. These suggestions are regarded as unjustified and if it should replace existing proven management methods it could only lead to complete chaos in the modern business world (refer section 2.5.4.3).

##### **2.5.4.1 Meaning of Ubuntu**

Ubuntu in the English language means 'humanness' (Broodryk, 2002:14). The late South African black conscious leader, Steve Biko for example rejected certain western values and traditions of the power-based western society. He maintained that the western society is concerned with improving its technological knowledge while neglecting its spiritual values.

According to Broodryk (2002:7) Ubuntu was defined as:

“a comprehensive ancient African world view based on the values of intense humanness, caring, sharing, respect, compassion and associated values, ensuring a happy and qualitative human community life in a spirit of family.”

#### 2.5.4.2 Value base of Ubuntu

The Xhosa proverb “Ubuntu ungamuntu ngabanye abantu” (people are people through other people) most probably best reflects the claimed spirit of Ubuntu (Broodryk, 2002:13). The Ubuntu philosophy is to make the world a better and happier place for mankind, a world of less greed, crime, stress and strife and more happiness and compassion. Ubuntu is based on certain basic values.

Core values	Associated values:
Humanness	Warmth, tolerance, understanding, peace, humanity.
Caring	Empathy, sympathy, helpfulness, charitable, friendliness.
Sharing	Giving (unconditionally), redistribution, open handedness
Respect	Commitment, dignity, obedience, order, normative.
Compassion	Love, cohesion, informality, forgiving, spontaneity.

**Table 2.1: Basic values of Ubuntu**

According to Broodryk (2002:18-19) values are the means which one uses to manage one’s personal life and protects that of the community. Table 2.1 identifies the core and associated values of Ubuntu respectively.

#### 2.5.4.3 Evaluation of Ubuntu

In evaluating Ubuntu as a management method to manage a modern society, it appears that:

- a) it is by no means a comprehensive, practical and integrated management method,
- b) it is not based on a logic but on a spiritual philosophy,
- c) the fact that it is a carry-over by word of mouth from generation to generation since times immemorial harbours the danger of line loss. The true meaning of this philosophy could have seriously been distorted through the generations,
- d) it can never be successfully applied in the complex competitive global environment of today. It can not even remotely be considered as a substitute for existing management approaches or be used as an exclusive system to manage an organisation let alone the world. Recently Adams (Rapport, 26 November 2006, By:3) concluded that this philosophy must be regarded as the greatest obstacle to black self-advancement,

- e) the cultural differences in the world limit its application and it can at best be seen as a tiny aspect of the much broader and complex management concept,
- f) the philosophy of Ubuntu has definite values and lessons, which in effect already form a very small part of the broad world-wide management approaches, and
- g) it is difficult if not impossible, to accept that the philosophy of Ubuntu could be proposed as the sole means of ensuring a happy, prosperous and peaceful world society or as a substitute for proven management approaches.

There are many more programs or management innovations. They all have developed with the objective of serving or solving a few management aspects only. Over the past 40 years numerous management fashions and fads have appeared. Critics argued that managers are quick to adopt quick fixes and that new techniques may not represent permanent solutions. Others feel that managers adopt new techniques because they are working toward continuous improvement of the results of their organisations in a highly competitive and uncertain world.

### 2.5.5 Summary of the management practices

The advantages of the management approaches, techniques and programs discussed so far are summarised in table 2.2 for easier comparison and evaluation.

MANAGEMENT PRACTICES	MAIN FEATURES
MANAGEMENT APPROACHES	
Classical management approaches	
Systematic management approach	<ul style="list-style-type: none"> <li>- Build specific procedures and processes into operations to ensure the coordination of effort</li> <li>- Emphasises economical operations</li> <li>- Maintain inventories to meet consumer demand</li> <li>- Maintain control of the organisation and staffing</li> </ul>
Scientific management approach	<ul style="list-style-type: none"> <li>- Utilises scientific methods in studying and analysing individual tasks</li> <li>- Establishes optimal working methods</li> <li>- Establishes performance standards to maximize efficiency</li> <li>- Focuses on a few key principles</li> <li>- Combines key principles in order to improve performance</li> <li>- Selects the most suitable workers</li> <li>- Trains selected workers</li> <li>- Pays workers according to output</li> </ul>
Administrative management approach	<ul style="list-style-type: none"> <li>- Presents a functional analysis of the management process</li> <li>- Systemises the practice of management</li> <li>- Provides guidance and direction to managers</li> <li>- Defines management into the functions of</li> </ul>



	planning, organising, leading and controlling
Contemporary management approaches	
Quantitative management approach	- Applies mathematics, statistics and other quantitative techniques to solve managerial problems
Organisational behaviour and human behavioural management approach	- Deals with the human aspects of organisations - Studies and identifies the management activities which, will improve the effectiveness of employees through an understanding of the nature of individual, group and organisational processes
Systems theory	- Analyses the organisation as a whole and the different parts of which it consists
Contingency theory	- Analyses circumstances in the organisation's external environment - Analyses the internal strengths and weaknesses of the organisation - Analyses the values, skills and attitudes of managers and workers in the organisation - Analyses the type of tasks, resources and technologies the organisation uses
TYPE	FEATURES
MANAGEMENT TECHNIQUES	
Total quality management	- Focuses on customer satisfaction through managing the total organisation to deliver the required quality of products and services to the customers
The learning organisation	- The organisation culture encourages individual learning as well as collective learning about the organisation itself
Work breakdown structures	- Develops a framework to organise the work, establishes effective means for communication and cost control projects
Activity-based management	- Implements activity-based costing by management of an organisation. It is a method used by management to cost its activities
MANAGEMENT PROGRAMS	
Managing by objectives (MBO)	- Sets objectives for and by each individual member of a section department or an organisation as a whole
Managing by exception (MBE)	- Managers set up a reporting system that will signal when their attention and involvement are required
Managing by decision models (MBDM)	- Test variables by comparing alternatives
Managing by styles (MBS)	- Select a leadership role that will best influence the people within a certain situation
Managing by competitive edge (MBCE)	- Concentrates on the rules of competition among departments, groups and individuals
Managing by coaching and development (MBCD)	- Selects tasks, work assignments or projects in order of increasing difficulty and challenges - Attains systematic improvement in knowledge, skills and attitudes through concerted teaching and coaching
Managing by information system (MBIS)	- Develops information centres for deliberating, generating, distributing, storing and returning information needed across

	<p>disciplines, functions and departments</p> <ul style="list-style-type: none"> <li>- Ensures that information is available at the right time and in the right form</li> </ul>
Managing by work simplification (MBWS)	<ul style="list-style-type: none"> <li>- Studies and analyses to discover simpler and more effective methods of accomplishing work</li> <li>- Develops changed methods of work for purposes of lowering costs, improving productivity or bettering the quality of output</li> </ul>
Managing by organisational development (MBOD)	<ul style="list-style-type: none"> <li>- Designs and implements plans to assist the members of an organisation to interact more effectively in their pursuit of objectives</li> <li>- Requires one or more change agents whose job it is to assist the organisation in creating conditions for change</li> </ul>
Ubuntu: An African Philosophy	<ul style="list-style-type: none"> <li>- Uses certain basic values to management of community life</li> </ul>

**Table 2.2: Management practices**

These management practices made and are still making significant contributions in improving the management knowledge, skills and proficiency of managers and enabled mankind to move forward. Most of them cover only a part of the management discipline. None could be regarded as a complete comprehensive, practical and integrated management method. Mainly the scientific, administrative and systems management approaches were utilised in the development of the comprehensive, practical and integrated management method. During the process of developing the theory for the comprehensive, practical and integrated management method the author indicated where some of these practices featured or were utilised.

## **2.6 DISCUSSION OF THE MANAGEMENT DISCIPLINE**

In this section some of the most recent, available and relevant descriptions of the management discipline were discussed. At the end the deficiencies, where applicable, they were briefly summarised and utilised to compare with the theoretical and practical deficiencies identified in chapters 2 and 4 in order to develop the guidelines for developing the theory for the ideal comprehensive, practical and integrated management method in chapter 5.

### **2.6.1 The overall view of the management discipline**

Fayol (1949:43-107) was the first to propose a statement on the theory of general management, initially stating that management must be seen as a process consisting of the five managerial functions of planning, organising, commanding, coordinating and controlling (refer section 2.5.1.1 d). Rue and Byars (1989:12-13) classified the practice of management into the five functions of planning, organising, staffing, leading and controlling (refer figure 2.19). According to Allen (1973:49-50) the functions of commanding and coordinating was lately substituted by the single function of leading by the majority of management theorists and practitioners

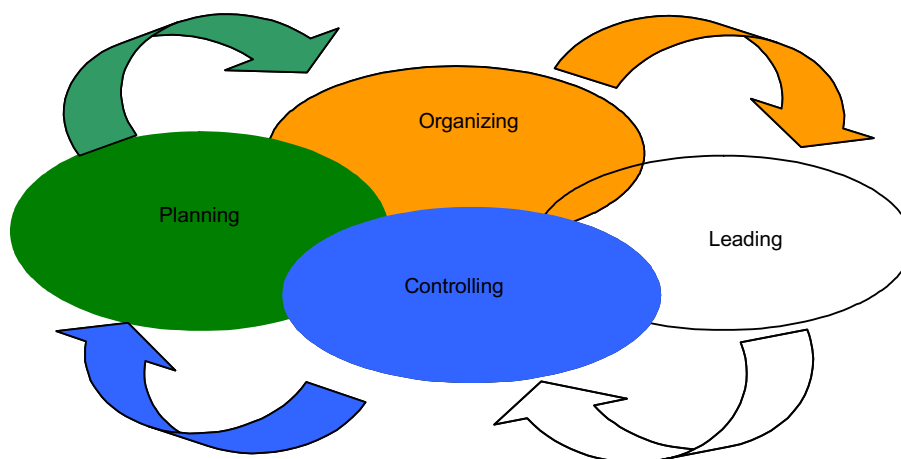


According to Allen (1973:49):

“Other investigators and writers agree substantially on the planning, organizing, and controlling functions, as defined, which follows from the basic work of Henri Fayol. There is most disagreement on the nature of the leading function. The usual approach has been to identify two or more ‘people’ categories, such as ‘staffing’ and ‘directing’, or to overlap the category with the planning, organizing, or controlling functions. First developed in 1959, the leading function, as defined, seems to be as acceptable a ‘people’ category as any. The important conclusion, in this case, is not the semantic label, but rather the work to be done and the objectives to be achieved.”

Some management theorists argued that the many management concepts available in the management fraternity caused confusion. They suggested that a uniform management framework or approach was necessary. The framework of planning, organising, leading, and controlling seems to be the most popular way of structuring managerial knowledge. Management textbooks based on this framework are extensively used around the world.

Today the vast majority of management thinkers, supports the administrative management approach and accept the classification of management work into the four functions of planning, organising, leading and controlling Drucker (1968:1-450), Allen (1973:49-53), Bedeian and Glueck (1983:174), (Griffin, 1987:10-13), Smit and Cronje (1992:5), DuBrin (1994:71), Donnelly et al (1998:138-240), Williams (2000:7), Bateman & Snell (2002:14-16), Hellriegel et al (2005:9-10) and McDaniel & Gitman, (2008:1-620) to mention only a few. Most authors, in many respects, seemingly arbitrarily further subdivided the management functions into management activities, rules, steps or processes.



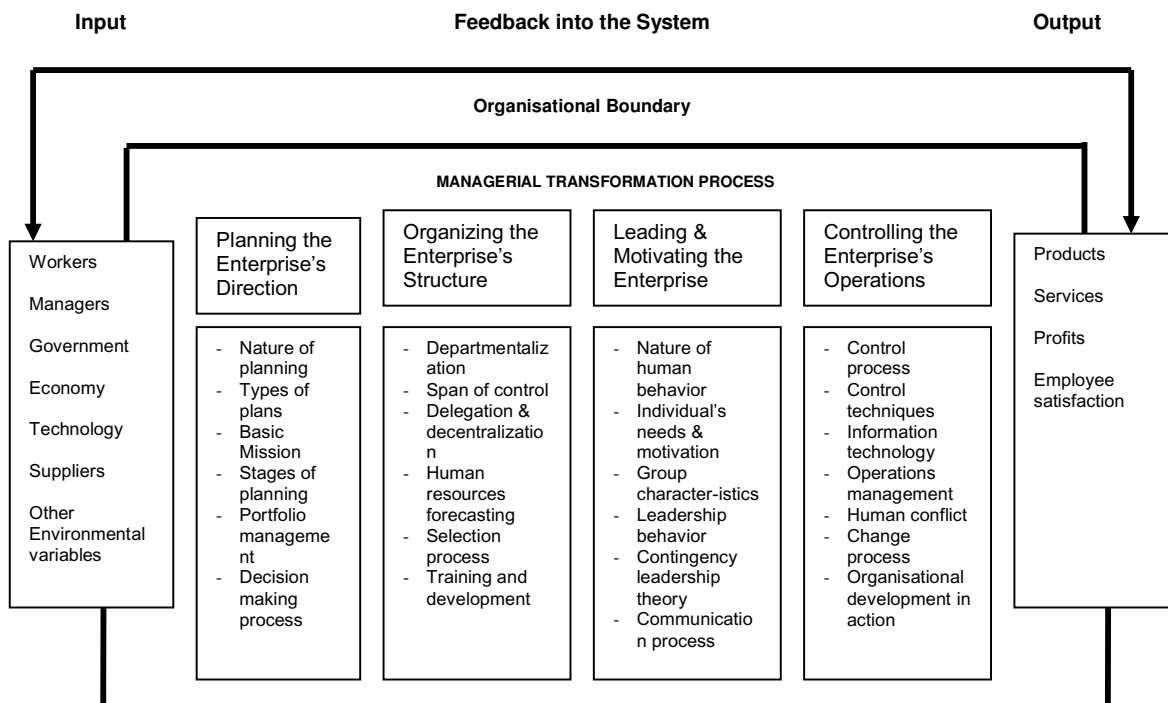
**Figure 2.19: The management functions**

## 2.6.2 The management functions

The successful manager must perform the four basic managerial functions of planning, organising, leading and controlling. The percentage time that a manager spends on each of these functions depends on the type of work, particular level of the position and the strategy of the organisation. Regardless of the managerial level each manager has to perform all of these functions more or less simultaneously rather than in a preset order or sequence. The best way in which to obtain an average picture on the time generally spend on these functions can be approximated by planned investigations.

Not anyone of the four managerial functions can be prioritised ahead of one another. Normally it just seems the right thing to do to start off in any discussion of the managerial functions with the planning function. Many management theorists and practitioners agree with this statement. It is not possible to present the management process diagrammatically.

It would be more correct to view the management process as consisting of many systems where all the management actions are being performed within each system, however small, by each employee. Many management authors prefer to present management as a transformation process (refer figure 2.20). The interrelationships between these functions, although real and most relevant, will for the sake of clarity be dealt with separately during the discussion of the various views of the management discipline.



**Figure 2.20: Management as a transformation process**

Source: Hodgetts & Kuratko (1988:21)

### 2.6.2.1 The planning function

After the end of World War 11 managers start to utilise ex-army officers to apply the concept of long range planning to the work of top managers in business organisations. It was only then that formal planning processes were developed and became widely used in the industries (Drejer, 2002:2). Historically, planning was very much an autocratic top down process. In the new era it is much more a participative process where more employees are to some extent involved and endeavour to contribute maximum value to the results of the company (Bateman & Snell, 2002:14).

McDaniel and Gitman (2008:211) stated that planning:

“is the process of deciding what needs to be done to achieve organizational objectives; identifying when and how it will be done; and determining by whom it should be done.”

Planning is deciding in advance what is to be done. It is a projected course of action. Planning therefore involves the conscious creation of a desired future state and the statement of an effective method or means to achieve just that.

Ackhoff (1970:23) said that:

“planning is predicted on the belief that the future can be improved by active intervention now.”

Rue and Byars (1989:168) defined planning as:

“the process of deciding what objectives to pursue during a future time period and what to do to achieve those objectives.”

Daft (2000:8) commented that planning is the:

- defining of objectives for future organisational performance, and
- deciding on the tasks and the utilisation of resources required to realise these objectives.

Planning in the new era was described as delivering strategic value and was viewed by most of the management theorists as the work managers perform to predetermine a future course of action. As a decision-making process, it focuses on the future of the organisation and how it would get where it wants to go, at what cost and over what period of time. It would involve more than one person most of the time operating cooperatively (Branch, 1999:143).

A plan can only be executed successfully when the proper control measures are developed, instituted and maintained. Hellriegel et al (2005:9) viewed planning as the determination of the objectives for the

organisation and how the organisation should achieve it. From a system's perspective every organisation would prefer to be in a 'preferred' state which represents the situation where it is achieving its defined objectives.

McDaniel and Gitman (2008:186) defined a business plan as:

“A formal written statement that describes in detail the idea of a new business and how it will be carried out; includes a general description of the company, the qualifications of the owner(s), a description of the product or service, an analysis of the market and a financial plan.”

From the above it is clear that any organisation wishing to be in a 'preferred state' should, by means of efficient planning, determine what this 'preferred state' should be. Significant deviations should be evaluated and corrected as soon as feasible. Donnelly et al (1995:156) said that planning should occur at all the levels of the organisation. Of the four management functions of planning, organising, leading and controlling, planning is the most fundamental. Everything else stems from planning.

#### **a) Importance of planning**

Donnelly et al (1998:139) maintained that many managers regard planning as the primary management function and the other functions as secondary (refer figure 2.21). According to Allen (1973:54-56) management work would always be utilised to plan, organise, lead and control management and technical work. The elements of both are so intertwined that without a proper logic it would be impossible to understand and apply the whole of management.

On the importance of planning Steiner (1969:732) quoted the description of planning by the Spanish Jesuit, Balthazar Gracian more than four centuries ago as follows:

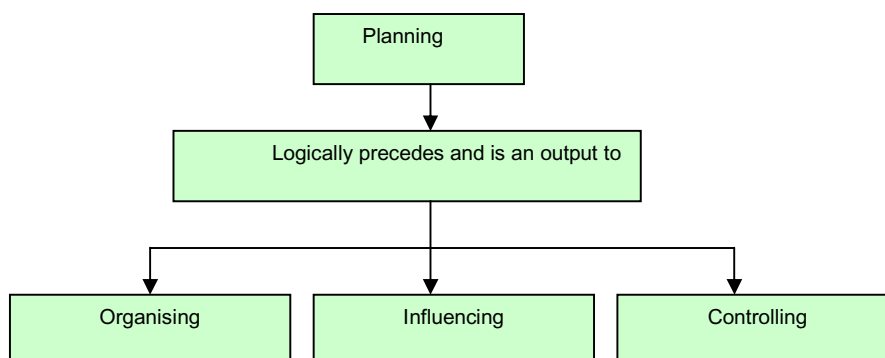
“Think in anticipation, today for tomorrow, and indeed for many days. The greatest providence is to have forethought for what comes. What is provided for does not happen by chance, nor is the man who is prepared ever beset by emergencies. One must not, therefore, postpone consideration till the need arises. Consideration should go beforehand. You can after careful reflection, act to prevent the most calamitous events. The pillow is a silent sibyl, for to sleep over questions before they reach a climax is far better than lying awake over them afterward. Some act and think later – and they think more of excuses than consequences. Others think neither before nor after. The whole of life should be spent thinking about how to find the right course of action to follow. Thought and forethought give counsel both on living and achieving success.”

Planning helps one to master the future and bridges the gap between the present situation and where one should be at a specific time in the future. It is the platform for stating the required results and to

define the necessary objectives for each employee in the organisation and the company as a whole. It is vital for teamwork because it is the best way of integrating the efforts of innovative, productive people and to encourage them to think through, before they take action, what they want to do and how they should do it. Donnelly et al (1998:142) stated that planning can occur at all levels in an organisation and that in some companies planning is being pushed down to the lower levels.

According to Bedeian and Glueck (1983:176) and Dessler (1982:35) the planning function is important because it:

- i) plays an indispensable role in the coordination of activities and in preparation for change,
- ii) still is the best way for organisations to determine the future course of action and to control work in progress,
- iii) helps organisations to succeed,
- iv) provides direction and purpose,
- v) helps to reveal future opportunities and threats and to cope with change,
- vii) contributes to the performance of the other management functions,
- viii) prevents piece-meal decisions,
- ix) keeps the employees focused and assists in developing managers,
- x) assists to discover new opportunities,
- xi) anticipates and minimises future problems,
- xii) develops effective courses of action,
- xiii) keeps the employees interested and enthusiastic by assisting them to see how their work contributes towards the overall effort,
- xiv) assists management to make the most effective and economical use of resources,
- xv) is the best vehicle for determining performance standards and establishing of control,
- xvi) is a prerequisite for control, and
- xvii) ensures coordination throughout the entire organisation.



**Figure 2.21: The primacy of planning**

## **b) Hierarchy of plans**

The normal planning structure of organisations consists of various term plans. Black and Porter (2000:174- 176) proposed the hierarchy of plans as depicted below:

### **i) Strategic plans**

The purpose with strategic planning is to arrive at the decisions necessary for the long-term successful operation of the organisation. Strategy is the intelligent deployment of limited resources. It is imperative to determine the objectives and the appropriate strategies required. Once the strategy is established, the structure of the organisation sets the framework for the other organisational design decisions (Galbraith, 1995:19).

McDaniel and Gitman (2008:213) described strategic planning as:

“The process of creating long-range (one to five years), broad goals for the organization and determining what resources will be needed to accomplish those goals.”

The corporate strategy can be described as the sense of purpose of an organisation, which guides it to realise its objective (Lowson, 2002:40). The formation of a winning strategy requires that a series of difficult choices must be made (Pietersen, 2002:43).

Strategic plans commence when management considers and evaluates their current position with respect to their mission, goals, and strategies. The organisation’s internal and external environments are investigated and strategic factors that may require change are identified. Internal or external events may require that the mission or goals must be redefined and a new strategy formulated at either the corporate, business, or functional level.

A company’s business must be defined by what objectives it wishes to realise, its customers it wants to serve, the technologies it would use and the functions it would have to perform (Thompson & Strickland, 1999:20). Strategic plans focus on the future of the organisation and must incorporate the external environmental demands and internal resources into the actions managers need to take (Black & Porter, 2000:174).

Strategic planning normally covers the future three to five year period and focuses on the entire organisation and would include the human resources, technology, products, services and finances. For success every strategic plan must ensure that adequate reciprocity between the strategic and the operational activities is established (Cook, 2000:12).

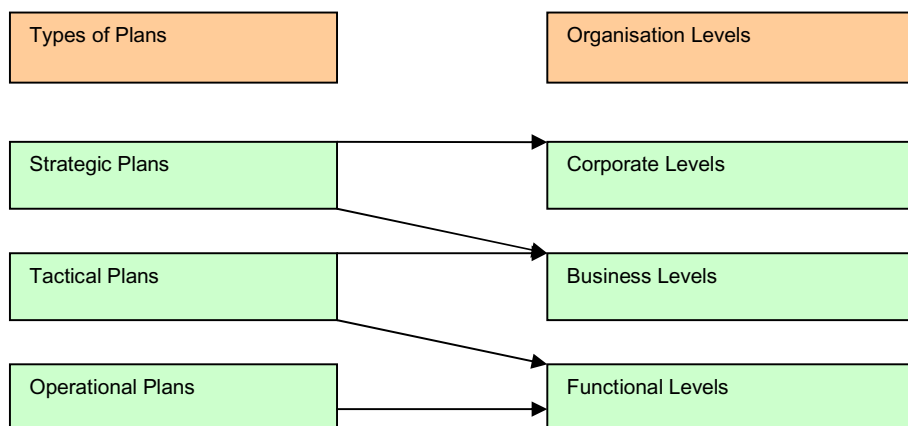
## ii) Tactical plans

Black and Porter (2000:175) stated that the purpose of tactical plans is to translate strategic plans into specific goals for specific parts of the organisation. Consequently, it has a one to two year time frame, is narrower in scope and is seldom broader than a strategic business unit. Tactical plans are somewhat complex but more specific because of the limited domain of application. It can affect specific businesses but generally not the survivability of the entire organisation. It must take the resources and capabilities of several units within a business into account. According to Hellriegel et al (2005:183) tactical planning is about making concrete decisions who should do what, how and when within a time span of one year. The concept of tactical plans is generally not used in the South African mining industry and would therefore not be further investigated in this thesis.

## iii) Operational plans

Operational plans in turn translate tactical plans into specific goals and actions for small units of the organisation and are normally compiled for a period of twelve months or less. It focuses on departments or smaller units of the organisation. It has a low interdependence since it is linked to higher-level tactical and strategic plans but is less interdependent with them and it uses analytical thinking to deal with real-world problems (Chase et al, 2001:6). The functional levels mainly compile operational plans. The interaction between the different types of plans and the organisational levels is depicted in figure 2.22 (Black & Porter, 2000:179).

Care should be taken to ensure that the most appropriate plans for each employee, section, department and the organisation are instituted. It is imperative that the employees performing the physical tasks have detailed plans.



**Figure 2.22: Interaction between levels and plans**

Source: Black & Porter (2000:179)

#### **iv) Action Plans**

Black and Porter (2000:184-186) stated that action plans are essentially the marching orders, which every one uses to accomplish the formulated objectives. For the successful execution of action plans it is important that management should always compile it with a view to support the strategic plan. It is compiled in as much detail as practically feasible under the specific circumstances. The concept of action plans is not generally used in the South African mining industry. It generally utilises the concept of project plans which is discussed in the following section and in chapter 5.

#### **v) Project planning**

Project planning has to do with the planning of specific projects and is valid only for the duration of the planning and integration of the project into the normal operations. In the practical situation the interaction, coordination and integration of the different plans in the organisation are much more complicated (refer section.5.6.2.9). The interaction between the different levels and plans are important for adequate integration and coordination of the planning work.

#### **vi) Standing plans**

Standing plans are plans that are fixed until such time as it becomes necessary, for valid reasons, to adjust, replace or disband it. Each time when it becomes necessary to ensure that tasks should be performed in a specific manner a standing plan would be compiled.

### **1. Policies**

Policies are mostly defined as standing plans that establish the boundaries within which specific types of decisions could be made. The degree of judgement would vary from level to level of the organisation. Policies could in some instances be broad and in some instances very narrow and limiting.

The importance of policies is that they:

- make decisionmaking easier and simpler with less time wasted,
- are established either by management, through appeals, as implications from decisions from executives or imposed from externally,
- provide permission to managers to delegate decisionmaking to subordinates,
- simplify decisionmaking, and
- assist to secure consistency and equity in decisionmaking.



## **2. Rules**

Rules are made from time to time as the situation changes and warrant a change or total abolishment of a specific rule. It is extensively used in smaller units of organisations. All serve to assist in the achievement of the objectives of the organisation. They are specific statements of what must or must not be done in a given situation. It leaves no room for discretion. They may be viewed as the far end of a policy continuum showing degrees of discretion. Rules are normally instituted in order to ensure that all employees in a specific section or department comply with safety, production and specific standard instructions of that section or department. They are normally instituted by the supervisor of a section, department or technical experts and sanctioned by the head of the department.

## **3. Procedures**

Procedures are guides to execution or action. They consist of detailed chronological sequences of steps performing or handling frequently occurring tasks or events. There are usually little room allowed for discretion. They pervade all levels of the organisation, cut across departmental lines and make routine certain types of recurring activities and allow activities to be delegated to the lowest organisational levels. They are extensively used in the training of technical personnel and operators.

## **4. Standards of performance**

Hussey (1999:30) viewed standards of performance as a logical development from the concept of goals. The literature does not supply adequate detail on how to set performance standards, especially for the managerial levels. A standard of performance is normally seen as a numerical quantity that serves as a yardstick for measuring work in progress or completed. Confusion with respect to performance setting exists.

The setting of performance standards are irregular and are not determined consistently throughout the organisation on all the levels. The setting of performance standards would be dealt with in much more detail during the development of the theory of the comprehensive, practical and integrated management method in chapter 5.

### **vii) The planning time horizon**

The planning time horizon differs from author to author and from organisation to organisation. It is dependant on many factors such as type of business, locality, competition, markets, products, culture and management preferences to name but a few. The long-term plan would be compiled for a much longer period than the operational plans. Many factors would determine the terms of plans.

Strategic planning	1-5 years +
Long-term planning	2 – 5 years
Intermediate-term planning	1 – 2 years
Short term planning	Today – 1 year

**Table 2.3: Planning time horizon**

In most companies the contractual periods require that long-term plans in terms of critical issues such as provision of resources, sustainable development, training and development of personnel, community involvement and environmental rehabilitation being compiled for the duration of the contractual period. In order to sharpen the focus, managers must compile various term plans as a basis for the efficient execution of the strategy and operations of the organisation (refer table 2.3). These plans must be updated whenever the situation requires it.

### **c) The planning process**

The planning process, as one of the organisation's key management mechanisms, must be adapted to the specific situation in which it has to be applied – it must specify the future course of action and the resources required for that (Lock & Farrow, 1983:31). Despite wide differences some management theorists suggested that the planning process should follow the following logical steps.

- i) Establish objectives.
- ii) Identify available alternatives.
- iii) Evaluate alternatives.
- iv) Select the most appropriate alternatives.
- v) Formulate supporting plans.
- vi) Implement plans – organise,
  - influence, and
  - control.

None of the planning processes described in the available literature consisted of a complete logical sequence of steps that could be utilised as guidelines for the planning function in a comprehensive, practical and integrated management method. It would appear that a uniform logical integrated management planning process does not exist at present (refer section 1.5.2.3, 2.6.2.6 and table 2.4).

#### **d) General hierarchy of objectives**

A great variety of objectives had been and is still being suggested and proposed from time to time by authors on management literature. For the purpose of this thesis only definitions and descriptions of the most common known type of objectives would be discussed.

##### **i) Vision**

Hussey (1999:22) stated that a vision is top management's expression of what the organisation is striving to become and incorporates both the critical values of the firm and mission statements. An organisational vision is generally seen as a directive or something that should motivate employees toward a dedicated effort to realise the organisation's dream and provide clarity to those who follow it.

Vision statements must be stable enough to provide direction, however it must also evolve over time. Visions provide a stable and unifying target or image for organisational members, and they motivate organisational members to reach for a new order. A vision is semi-permanent, it is likely to outlast any strategic plan that may be prepared, but it would not last forever. Hellriegel et al (2005:181) stated that a vision expresses the fundamental aspirations and purposes of an organisation by appealing to the hearts and minds of its members. Campbell and Craig (2005:26) concluded that a vision could be interpreted as an inspirational view of the desired state of the organisation at a point in the future.

According to Lane et al (2006:180) a vision should be:

- understandable,
- accepted by the total local and global workforce,
- dealing with change, and
- giving a clear direction at all times.

The concept of a vision seemed to create a lot of confusion among organisations. Visions differ markedly from one company to another.

From a summary of various literature sources it was concluded that a vision could generally be viewed as an unusual discernment of foresight, something seen or an object of imagination. In short it could be seen as an objective to be realised and should be set in the same way as objectives. They would normally be vague statements of what the company wishes to achieve.

##### **ii) Mission**

The organisation's mission is a formal statement of the organisation's purpose, describes its basic philosophy and reason for its existence (McDaniel & Gitman, 2008:213). According to Austin and

Pinkleton (2000:16) a mission statement should identify the products the organisation intends to produce, the services it provides and the types of relationships it strives to cultivate. Hellriegel et al (2005:181) and Campbell and Craig (2005:26) stated that the mission of an organisation is the purpose for the existence of the organisation.

According to Campbell and Craig (2005:27) a mission has the following advantages:

- it clearly communicates the objectives and values of the organisation,
- it directs all employees to work in the same direction, and
- it influences the actions and attitudes of the employees in the organisation.

From a summary of various management literature sources it was concluded that a mission should generally be viewed as a specific task with which a person or a group is charged, a calling or vocation, a task assigned or performance of a service or carrying on of an activity by a body of persons. The mission is the strategy or method required to realise the vision or objective of the organisation.

The mission statement of the organisation should clearly spell out the business in which it operates and the method how it intends to achieve the stated results. It basically is the unqualified method that the organisation defined as initial directive to direct the planning process.

### **iii) Objectives**

Objectives are defined as the end results that must be planned for. They define specific results to be achieved. Hussey (1999:24) defined an objective as specifically relating to the five-year plan and as the maximisation of profits. For the development of the theory for the comprehensive, practical and integrated management method in chapter 5 only the term objective would be used.

### **iv) Goals**

Goals can only be set after the strategy had been developed. It is a very different type of objective from the vision and the profit objective and which is determined before the strategy is formulated.

Hussey (1999:28) defined goals as:

“quantified objectives that provide a unit of measurement.”

According to Hellriegel et al (2005:181) goals express the results that the organisation selected to achieve for its long-term survival. The term goal is very rarely used in the South African mining industry and would as a result for the purpose of developing this thesis be seen as synonymous to an objective and not further be investigated.

### **e) Assessment of risks**

According to Shimell (2002:129) every job and task has an element of risk. Risks could be classified into macro, micro, environmental, social and ethical risks. Macro risks are external whilst micro risks are internal. In addition legislative and regulatory risks are also a reality that organisations should fully be aware of at all times (Shimell, 2002:151-153).

Risks relate to situations in which outcomes are uncertain or bear a definite measure of risk. Risk management is instituted because the management of it would enhance the realisation of objectives and reduce the probability of possible losses and catastrophes. Risk management is the single most important key to success. The changing nature of environmental standards and circumstances requires regular risk assessments (Smullen, 2000:8).

#### **2.6.2.2 The organising function**

According to McDaniel and Gitman (2008:215) organising is the process of coordinating and allocating a firm's resources in order to carry out its plans. Chandler (1969:19) stated that before the 1850s very few businesses in the United States of America required the services of a full-time administrator or a clearly defined administrative structure since enterprises were mostly one man concerns or very small.

The increase in the sizes of enterprises during the 1880s and 1890s, however, brought entirely new problems of industrial management and led to the building of the first sizable administrative structures in the American industry. The organisation of enterprises was the result of the expansion and development of new structures to optimise resources. It started when basic operations were assigned to different individuals. An organisation is also viewed as a subsystem of one or more larger systems.

The form that any particular organisation takes depends on the kinds of activities involved, and on the results planned. Normally the emerging organisation is a tailor-made instrument designed for a specific situation and purpose. As the organisation expands its operations the organisation would also change accordingly.

Donnelly et al (1998:188) stated that:

“The organizing function involves breaking down the overall task into individual jobs with specific duties and assigning authority to carry out those duties and aggregating the individual jobs into departments of specific bases and sizes. Thus we can describe the organizing function in terms of dividing tasks into jobs, delegating authority, determining the appropriate bases for departments, and deciding the appropriate size of each department.”

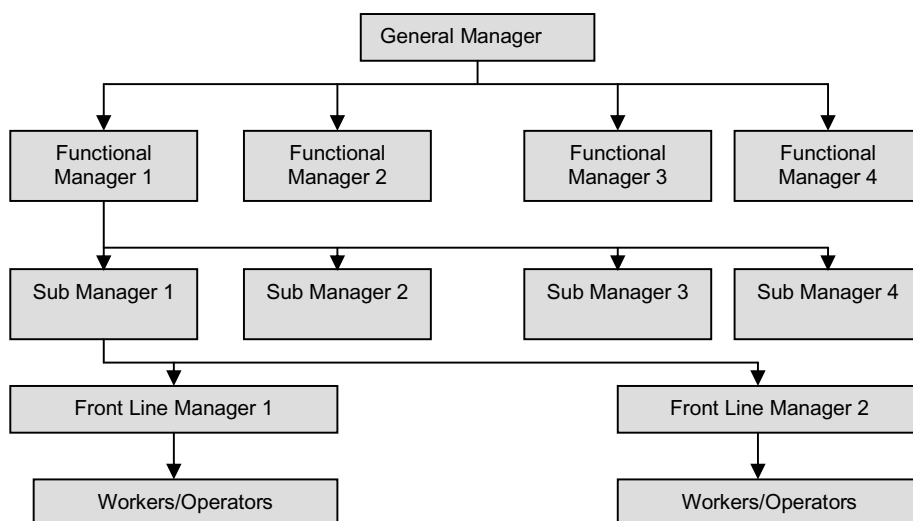
Black and Porter (2000:265-278) defined the organisational structure as the division of the organisation’s labour into specific units and the coordination of these units. Changes in the strategy would influence the structure. As organisations change their strategies their structures would adapt accordingly (Hodgetts & Kuratko, 1988:158). According to Daft (2000:8) organising is concerned with assigning tasks, grouping tasks into departments and allocating resources to departments. Bateman and Snell (2002:14) defined organising as the assembling and coordinating of human, financial, physical, and informational and other resources needed to realise objectives.

Hellriegel et al (2005:9) stated that organising:

“is the process of deciding where decisions will be made, who will perform what jobs and tasks, and who will report to whom in the company.”

Today mainly three basic types of organisational structures are recognised but in practice a whole variety could be found. The three most common types of organisational structures are the functional organisational structure (refer figure 2.23), the geographical divisional structure (refer figure 2.24) and the product divisional structure (refer figure 2.25).

In the functional structure, the activities of a specific function are grouped together from the top to the bottom of the organisation. For example all engineers are grouped together in the engineering department, all the production people in the production department and all the financial people in the financial department.



**Figure 2.23: Example of a functional organisational structure**

The advantages of the functional structure design are that it:

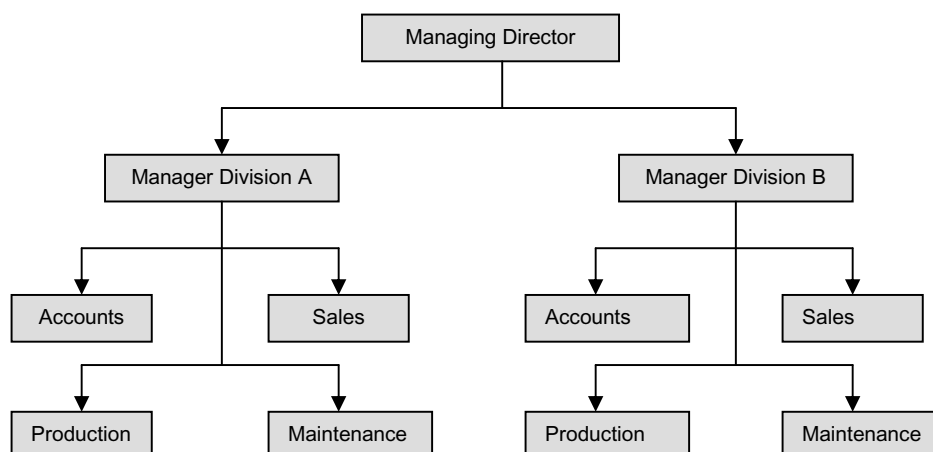
- facilitates rapid change in unstable environments,
- involves effective coordination across functions,
- is best in organisations with several products,
- leads to client satisfaction,
- decentralises decision making,
- consolidates all human knowledge and skills with respect to specific activities, and
- allows functional economy of scale.

The disadvantages of the functional structure design are that it:

- has a slow response time to changes in the environment,
- has inadequate coordination between departments,
- eliminates economies of scale in functional departments,
- leads to poor coordination across product lines,
- eliminates in-depth competence and technical specialisation, and
- makes integration and standardisation across product lines difficult.

When an organisation needs to expand and move some of its business into other areas and countries it would normally apply the geographic market segmentation principle (Rao, 2001:63). A geographical type of structure would then better suit such an arrangement.

Where the organisation produces different products in different areas, the products divisional type of structure would be more efficient. This type of structure has the following advantages and disadvantages.



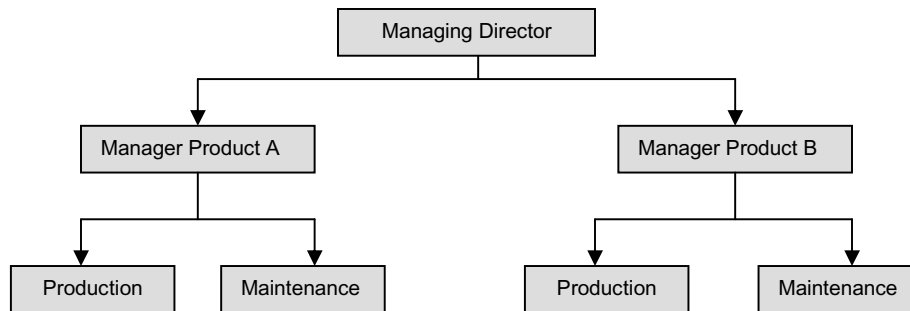
**Figure 2.24: Example of a geographical divisional structure**

The advantages are that:

- it provides high visibility of products,
- it is suited to fast change in an unstable environment,
- products could easily be adapted to the requirements of individual customers,
- coordination across functions is excellent, and
- it works best in organisations that supply multiple products or services.

The disadvantages are that:

- the organisation loses economy of scale,
- physical facilities have to be duplicated,
- some lines become separated from each other, and
- coordination across lines becomes difficult.



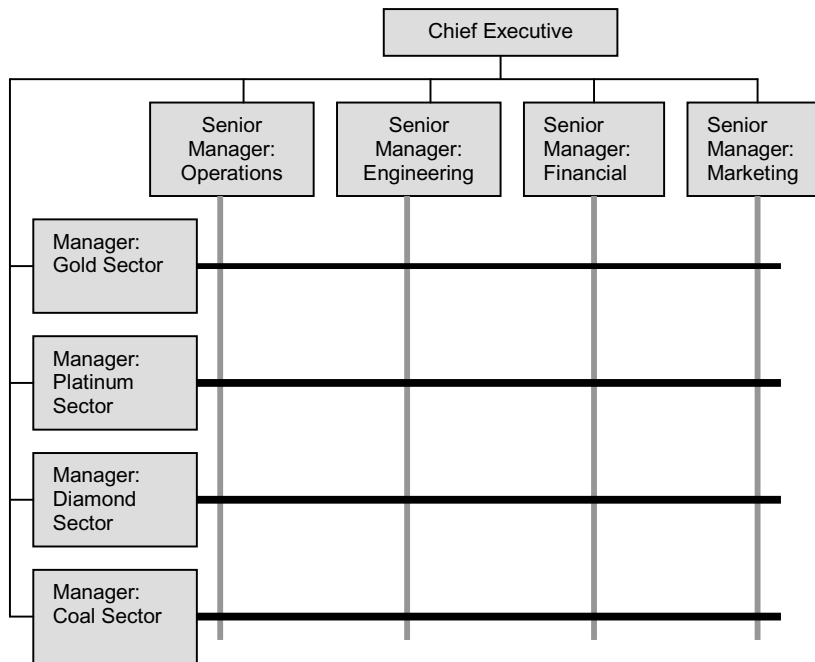
**Figure 2.25: Example of a products divisional structure**

Where the product and geography are emphasised at the same time the matrix organisation can be used. It works best when both technical expertise and product innovation and change are important for meeting organisational objectives. The matrix organisation is often the answer when organisations find that neither the functional, divisional, nor the geographical structures, combined with horizontal linkage mechanisms, would work. It is a strong form for horizontal linkage. The unique characteristic of the matrix is that both the product division and functional structures are implemented simultaneously.

The matrix organisational structure is deemed the best structure when:

- pressure exists to share scarce resources across product lines,
- environmental pressure exists for two or more critical outputs, and
- the environmental domain of the organisation is both complex and uncertain.





**Figure 2.26: Example of a typical matrix organisational structure**

This structure must be judiciously applied. It was developed for organisations where the functional, product divisional or functional geographical structures were not suitable.

The main characteristics of this type of structure are that:

- it facilitates discussion and adaptation to unexpected problems,
- it works best in organisations of moderate size with a few product lines, and
- too many product lines make it difficult to coordinate both directions at once.

The matrix is best suited when environmental change is high and when goals reflect a dual requirement, such as for both product and functional goals. The dual-authority structure facilitates coordination and communication, rapid environmental changes and facilitates an equal balance between product and functional supervisors. This organisation has specific strengths and weaknesses.

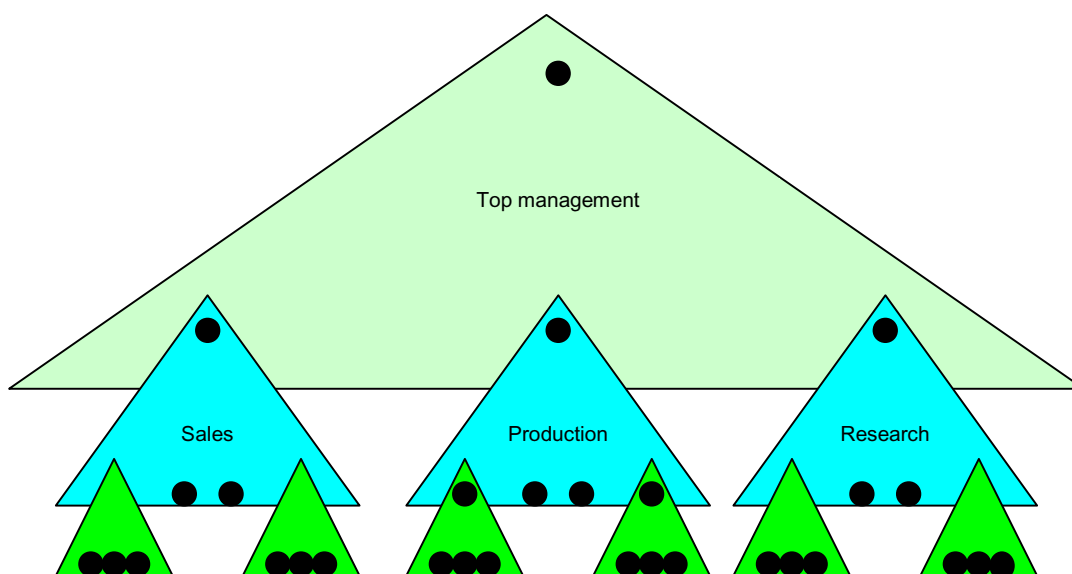
The main strengths are that it:

- achieves the coordination necessary to meet dual demands,
- is flexible in sharing human resources across products,
- is best suited to complex decisions and frequent changes in unstable environments,
- provides opportunity for both functional and product skills development, and
- functions best in medium-sized organisations with multiple products.

The main weaknesses are that it:

- causes participants to experience dual authority,
- requires that participants have good interpersonal skills,
- is time-consuming because it involves frequent meetings, and
- requires collegial rather than vertical-type relationships.

The behavioural management perspective forces managers of work groups to make their own decisions, which are conveyed upwards and downwards in the organisation. These managers serve a linking-pin role. This type of organisational structure is called the linking-pin structure (refer figure 2.27).



**Figure 2.27: Example of a linking-pin organisation structure**

The linking pin organisational structure is particularly functional with the participative management style and encourages group problem solving and cooperation among groups and individuals. The overlapping group structure enhances employee participation among functional groups and between hierarchical levels.

As the organisation increases in operations its control needs would as a result increase. The size of the organisation may have to increase or at least change. The span of control is also used as one of the criteria to design an organisational structure.

There are many proposals for organisational design. A company's organisational structure is dependant on the unique characteristics of its external environment, technology, and strategy. When looking at organisational design it is good to remember that in real life organisations consist of open and closed systems.

An open system must interact with the environment to survive; it both consumes resources and exports resources to the environment. It can not seal itself off. A closed system would not depend on its environment; it would be autonomous, enclosed, and sealed off from the outside world.

The literature did not anywhere indicate how an organisational structure could scientifically, systematically and logically be designed and developed (Davis & Weckler, 1996:19). Drucker (1968:352) argued that management as yet do not know how to organise human work. Robey (1991:44) argued that the environment, technology and the size of the organisation affect the design of an organisation. Pettigrew et al (2003:331-351) discussed various new forms of organisational design but did not propose a logical method to design and develop an organisational structure which would meet with the requirements of a comprehensive, practical and integrated management method.

Factors such as the type of product, area, and type of business, markets and localities would impact on the eventual structure. The three internal variables that have the greatest impact on the structures of organisations are the size of the organisation, the diversity of its operations and the characteristics of the personnel.

### **2.6.2.3 The leading function**

Fayol (1949:97-104) regarded commanding and coordination as the two components of leading with commanding as the one that sets the organisation in motion and coordination the one that harmonises all the activities of the business. Other management theorists used staffing and directing as synonymous to taking people action. According to Allen (1973:50) this confusion had been solved in 1959 by the introduction and acceptance by the majority of management theorists and practitioners of the single term of leading (refer section 2.6.1). According to Daft (2000:9) leading is the influencing of employees to realise the objectives of the organisation. Bateman and Snell (2002:15) argued that leading involves the manager's efforts to stimulate high performance by employees.

Hellriegel et al (2005:10) argued that leading:

“involves getting others to perform the necessary tasks by motivating them to achieve the organisation's goals.”

According to McDaniel and Gitman (2008:217) leading is the process of guiding and motivating others toward the achievement of organizational goals. Some authors break management functions into activities. These activities, to a large extent, are subjected to time and cultural influences and technological developments.

The development of the electronic science for example has changed the mode and speed of communication unrecognisably. Means to handle communication and reporting requirements had increased tremendously and would have to adapt to changing management requirements and newly developed equipment. Management should always be aware of this phenomenon and be prepared to adapt timeously (Daft, 2001:14).

The leading function as a whole was and always would be affected by the development of mankind and would affect the modes of application of the different activities of it. A hundred years ago a manager would not have dreamed of asking or motivating a subordinate to perform a task, he simply would have instructed him to perform the task. The leading function involves the influencing or the inspiring of the subordinates, peers or supervisors to perform the necessary management work by motivating them to realise their individual objectives as part of the unified effort to most efficiently realise the main objective of the organisation.

Communication for instance is particularly vulnerable to manipulation by both the sender and the receiver. According to Higgins (Thompson et al, 1999:33) the tailoring and tuning of communication to suit the receiver nowadays developed into a fine art. In people development the development of the potential of the individual employee has become the ideal in the Western culture (Yingling, 2004:327). The contribution of the employees in the organisation has become more important than ever before (Nel et al, 2004:47).

According to De Villiers (1973:13-14) the leadership qualities required at the lower levels are along more general lines as defined in the Manual of the Royal Canadian Air Force:

“Leadership depends on simple human qualities. Above all, a leader requires the confidence of his men and this is to be gained only by commanding their respect for his personal character and professional knowledge; his sense of justice and common-sense; his energy, keenness and forethought; his indifference to personal danger and readiness to share the men’s hardships; his cheerfulness in the face of difficulties; the clearness and simplicity of his orders and his firm insistence on their execution; the pride he takes in his command.”

#### **2.6.2.4 The controlling function**

Controlling consists in verifying whether all the work occurs in conformity with the plan adopted, the instructions issued and the principles established. An effective control system safeguards against surprises, capable of developing into catastrophes (Fayol, 1949:107-109). Massie and Douglas (1977:394) stated that planning must precede control. McDaniel and Gitman (2008:222) viewed controlling as the process of assessing the organisation’s progress toward accomplishing its goals.

Hellriegel et al (2005:10) stated that:

“The process by which a person, group, or organisation consciously monitors performance and takes corrective action is **controlling.**”

The main aim of controlling is to ensure that the results of operations conform as closely as possible to the stated required results. The secondary aim is to provide timely information that may prompt the revision of objectives. These aims are achieved by setting standards, comparing predicted and actual results against these standards, and taking corrective action. Donnelly et al (1998:241) expressed the view that controlling includes all the work the manager undertakes to ensure that actual results do meet with those planned for. Black and Porter (2000:475-478) stated that standards should be established for every employee at every level of the organisation and be as specific as possible.

Nowhere in the literature it could be established how could an organisation set performance standards for each task, and employee on each level of the organisation. From the literature consulted it would appear that performance standards are normally set for the lower levels mainly by special trained technical staff. Standards provide data that is necessary for making rational decisions (Buffa, 1965:331). The setting of performance standards is and could only be correctly performed during and with the planning process.

#### **2.6.2.5 Coordination**

Fayol (1949:103) defined coordination as the work to be performed in order to ensure that the tasks are logically performed by the people to whom it is delegated and that no duplications or omissions occur. Hodgetts and Kuratko (1988:188) described coordination as the synchronization of the efforts of individuals and groups for the purpose of attaining organisational efficiency. It is achieved by establishing a hierarchy of objectives, assigning the corresponding authority, delegating the necessary accountability and committees or project groups. In general most employees do not fully understand what coordination means. It is very difficult if not impossible to establish and to maintain with existing management practices since the theory for a comprehensive, practical and integrated management method does not exist at present. Coordination is perhaps the most misunderstood aspect of the management discipline. There is great ignorance with respect to the true meaning of coordination, which could largely be ascribed to the many management practices being employed in the business environment.

##### **a) Effective coordination.**

The characteristics of a properly coordinated organisation are that:

- i) all departments operate in harmony with each other and all objectives are formulated as directives to ensure the optimal achievement of the planned results of the organisation,

- ii) results from different levels and employees support the general objective of the organisation, and
- iii) all divisions are informed as to their contribution to the company's results.

**b) Ineffective coordination**

Signs of ineffective coordination are that:

- i) departments are ignorant of what each other is supposed to deliver, and
- ii) watertight compartments exist between the divisions of the different departments.

**2.6.2.6 Summary of the activities of the management functions**

The functions of management are largely accepted as planning, organising, leading and controlling. The most recent classification of management, management functions and management activities as proposed and discussed by 12 prominent management authors are summarised and depicted in table 2.4. There appears to be major differences between these authors. The author of this thesis is of the opinion that because of the lack of a universal management logic it is impossible to develop a comprehensive, practical and integrated approach to management.

Reference	FUNCTIONS			
	Planning	Organising	Leading	Controlling
Allen (1973:65) Allen (1973:50) Allen (1973:50) Allen (1973:50)	<ul style="list-style-type: none"> <li>• Forecasting</li> <li>• Developing objectives</li> <li>• Programming</li> <li>• Scheduling</li> <li>• Budgeting</li> <li>• Developing procedures</li> <li>• Developing policies</li> </ul>	<ul style="list-style-type: none"> <li>• Developing organisation structure</li> <li>• Delegating responsibility and authority</li> <li>• Creating accountability</li> <li>• Developing relationships</li> </ul>	<ul style="list-style-type: none"> <li>• Decision making</li> <li>• Communication</li> <li>• Motivation</li> <li>• Selecting people, and</li> <li>• Developing people</li> </ul>	<ul style="list-style-type: none"> <li>• Developing performance standards</li> <li>• Measuring performance</li> <li>• Evaluating performance</li> <li>• Correcting performance</li> </ul>
Massie and Douglas (1977:294) Massie and Douglas (1977:134-136) Massie and Douglas (1977:55-368) Massie and Douglas (1977:394-396)	<ul style="list-style-type: none"> <li>• Identify the goals</li> <li>• Search for opportunities</li> <li>• Translate opportunities into selected courses of action</li> <li>• Set specific targets</li> <li>• Continual review and revision</li> </ul>	<ul style="list-style-type: none"> <li>• Developing the organisational structure</li> <li>• Delegating responsibility and authority</li> <li>• Creating accountability</li> <li>• Developing relationships</li> </ul>	<ul style="list-style-type: none"> <li>• Motivation</li> <li>• Decision making</li> <li>• Staffing</li> <li>• Training</li> <li>• Counselling</li> <li>• Handling grievances</li> <li>• Communication</li> </ul>	<ul style="list-style-type: none"> <li>• Setting a target</li> <li>• Measuring performance</li> <li>• Making comparisons</li> <li>• Taking corrective action</li> </ul>
Thierauf, et al (1977:170-275) Thierauf, et al (1977:328) Thierauf, et al (1977:488-	<ul style="list-style-type: none"> <li>• Set objectives</li> <li>• Collect and forecast information</li> <li>• Make assumptions</li> <li>• Determine and evaluate alternative plans</li> <li>• Select the plan and develop sub plans</li> </ul>	<ul style="list-style-type: none"> <li>• Develop the organisational structure</li> <li>• Assign responsibility and authority</li> <li>• Create accountability</li> </ul>	<ul style="list-style-type: none"> <li>• Leadership</li> <li>• Motivation</li> <li>• Communication, and</li> <li>• Participation</li> </ul>	<ul style="list-style-type: none"> <li>• Establishment of performance standards,</li> <li>• Measure performance</li> <li>• Take corrective action</li> </ul>



622) Thierauf, et al (1977:634)				
Hodgetts (1981:52) Hodgetts (1981:113) Hodgetts (1981:72-227) Hodgetts (1981:259)	<ul style="list-style-type: none"> <li>Analyse the external environment</li> <li>Analyse the internal environment</li> <li>Determine competitive advantages</li> <li>Identify a target market</li> <li>Purchase and allocate resources necessary to implement the plan</li> <li>Control operations</li> </ul>	<ul style="list-style-type: none"> <li>Job descriptions</li> <li>Departmentalisation or grouping employees into posts</li> <li>Span of control or the number of people reporting to one supervisor</li> <li>Authority/responsibility relationships, authority the right to command</li> </ul>	<ul style="list-style-type: none"> <li>Decision making</li> <li>Recruiting</li> <li>Selection</li> <li>Training and development</li> <li>Communication</li> <li>Motivation</li> </ul>	<ul style="list-style-type: none"> <li>Formulate the plan</li> <li>Establish standards</li> <li>Compare results against standards</li> <li>Correct deviations</li> </ul>
Bedeian and Glueck (1983:175) Bedeian and Glueck (1983:300-452) Bedeian and Glueck (1983:134-576) Bedeian and Glueck (1983:629)	<p>Phase 1</p> <ul style="list-style-type: none"> <li>Establish objectives</li> </ul> <p>Phase 2</p> <ul style="list-style-type: none"> <li>Establish premises</li> <li>Forecast changes</li> </ul> <p>Phase 3</p> <ul style="list-style-type: none"> <li>Identify alternative courses of action</li> <li>Evaluate alternative courses of action</li> <li>Select a course of action</li> </ul> <p>Phase 4</p> <ul style="list-style-type: none"> <li>Implement plans</li> </ul> <p>Phase 5</p> <ul style="list-style-type: none"> <li>Evaluate plans</li> </ul> <p>Controlling</p>	<ul style="list-style-type: none"> <li>Organising jobs</li> <li>Span of control</li> <li>Organising and coordinating work units</li> <li>Delegate authority and responsibility</li> <li>Organising the total enterprise</li> <li>Organisational structure, change and development</li> </ul>	<ul style="list-style-type: none"> <li>Motivation</li> <li>Decision making</li> <li>Recruiting</li> <li>Selecting</li> <li>Performance appraisal</li> <li>Training and development</li> <li>Communication</li> </ul>	<ul style="list-style-type: none"> <li>Establish objectives</li> <li>Identifying performance predictors</li> <li>Establishing performance standards</li> <li>Comparing and evaluating performance against established standards</li> <li>Acting to reinforce success and deficiencies</li> </ul>
Hodgetts and Kuratko (1988:113-118) Hodgetts and Kuratko (1988:172-217) Hodgetts and Kuratko (1988:226-283) Hodgetts and Kuratko (1988:376)	<ul style="list-style-type: none"> <li>Forecasting</li> <li>Establishment of objectives</li> <li>Determination and choice of alternative courses of action</li> <li>Formulation of derivative plans</li> <li>Budgeting the plan</li> </ul>	<ul style="list-style-type: none"> <li>Job analysis</li> <li>Job description</li> <li>Span of control</li> <li>Delegation of authority and responsibility</li> <li>Coordination</li> <li>Development of the organisational structure</li> </ul>	<ul style="list-style-type: none"> <li>Recruit personnel</li> <li>Select</li> <li>Training</li> <li>Management development</li> <li>Communication</li> <li>Motivation</li> <li>Decision making</li> </ul>	<ul style="list-style-type: none"> <li>Establish performance standards</li> <li>Measure performance</li> <li>Evaluate performance</li> <li>Correct deviations from performance</li> </ul>
DuBrin (1994:74) DuBrin (1994:166-224) DuBrin (1994:97-355) DuBrin (1994:368)	<ul style="list-style-type: none"> <li>Define the present situation</li> <li>Establish goals and objectives</li> <li>Forecast aids and barriers to goals and objectives</li> <li>Develop action plans to reach goals and objectives</li> <li>Develop budgets</li> <li>Implement the plans, and</li> <li>Control the plans</li> <li>Evaluate the feed back</li> </ul>	<ul style="list-style-type: none"> <li>Job design</li> <li>Job specialisation</li> <li>Organisational structure</li> <li>Delegation of authority and responsibility</li> <li>Span of control</li> </ul>	<ul style="list-style-type: none"> <li>Decision making</li> <li>Motivating</li> <li>Communication</li> <li>Staffing</li> <li>Recruitment</li> <li>Selection and placement</li> <li>Training and development</li> </ul>	<ul style="list-style-type: none"> <li>Performance standards are set</li> <li>Performance is measured</li> <li>Performance is compared to standards</li> <li>Corrective action is taken if needed</li> </ul>



<p>Kroon and Van Zyl (Kroon, 1995:138-140) De Bruyn (Kroon, 1995:234) Du Toit et al (Kroon, 1995:351-480) Crous (Kroon, 1995:485-488)</p>	<ul style="list-style-type: none"> <li>Formulate the objectives</li> <li>Gather the information</li> <li>Evaluate the information</li> <li>Develop alternatives</li> <li>Develop the final plan</li> <li>Program, schedule activities and budget</li> <li>Execute and evaluate the plan</li> </ul>	<ul style="list-style-type: none"> <li>Determine the objectives of the organisation</li> <li>Determine the most important organisational activities</li> <li>Divide and group the activities</li> <li>Design the organisational structure</li> </ul>	<ul style="list-style-type: none"> <li>Motivation</li> <li>Leadership</li> <li>Communication</li> <li>Development, conflict and creativity</li> <li>Labour relations</li> </ul>	<ul style="list-style-type: none"> <li>Develop standards</li> <li>Measure performance</li> <li>Evaluate performance</li> <li>Corrective action</li> </ul>
<p>Donnelly et al (1998:141) Donnelly et al (1998:188) Donnelly et al (1998:372-416) Donnelly et al (1998:241)</p>	<ul style="list-style-type: none"> <li>Forecasts</li> <li>Budgets</li> <li>Objectives</li> <li>Action</li> <li>Resources</li> <li>Implementation</li> <li>Performance outcomes</li> </ul>	<ul style="list-style-type: none"> <li>Dividing tasks into jobs</li> <li>Delegating authority</li> <li>Determine the appropriate bases of departments</li> <li>Deciding the appropriate size of each department</li> </ul>	<ul style="list-style-type: none"> <li>Communication</li> <li>Negotiation</li> <li>Decision making</li> <li>Staffing</li> <li>Motivation</li> <li>Recruitment</li> <li>Selection and placement</li> <li>Training and development</li> </ul>	<ul style="list-style-type: none"> <li>Establishment of standards</li> <li>Measure performance against standards</li> <li>Taking corrective measures</li> </ul>
<p>Black and Porter (2000:179) Black and Porter (2000:265) Black and Porter (2000:365-467) Black and Porter (2000:473)</p>	<ul style="list-style-type: none"> <li>Analysis of the environment consisting of forecasts, benchmarks, contingencies, competitor analysis and scenarios</li> <li>Setting of objectives</li> <li>Determining of requirements</li> <li>Assessing of resources</li> <li>Developing action plans</li> <li>Implementing of plans</li> <li>Monitoring outcomes</li> </ul>	<ul style="list-style-type: none"> <li>Organisational structure as the sum of ways an organisation divides its labour into distinct tasks and then coordinates them</li> <li>Organisational design is the process of assessing the organisation's strategic objectives and environmental demands</li> <li>Organisational charts illustrate relationships among units and lines of authority</li> </ul>	<ul style="list-style-type: none"> <li>Decision making</li> <li>Motivation</li> <li>Communication</li> <li>Negotiation</li> </ul>	<ul style="list-style-type: none"> <li>Establish standards</li> <li>Measure performance</li> <li>Compare performance against standards</li> <li>Evaluate results and take action</li> </ul>
<p>Hellriegel et al (2005:193) Hellriegel et al (2005:298-303) Hellriegel et al (2005:206-382) Hellriegel et al (2005:10) Hellriegel et al (2005:193) Hellriegel et al (2005:298-303) Hellriegel et al (2005:206-382)</p>	<ul style="list-style-type: none"> <li>Develop the vision, mission and goals</li> <li>Diagnose the opportunities and threats</li> <li>Diagnose the strengths and weaknesses</li> <li>Develop the most feasible strategies</li> <li>Prepare the necessary tactical plans</li> <li>Control and diagnose the results</li> <li>Continue with planning processes</li> </ul>	<ul style="list-style-type: none"> <li>Designing of the organisational structure</li> <li>Delegation of the right and authority to make decisions in performing the assigned duties or responsibilities in order to accept the accountability for delivering the results required</li> <li>Development of relationships between the different units and departments which must be integrated and coordinated</li> </ul>	<ul style="list-style-type: none"> <li>Communication</li> <li>Decision making</li> <li>Training and development</li> <li>Motivation</li> </ul>	<ul style="list-style-type: none"> <li>Setting of performance standards</li> <li>Measuring of performance</li> <li>Correcting of significant deviations</li> <li>Adjusting of standards when necessary</li> </ul>





Hellriegel et al (2005:10)				
McDaniel & Gitman (2008: 211)	<ul style="list-style-type: none"> <li>Set objectives and state mission</li> <li>Examine alternatives</li> <li>Determine needed resources</li> <li>Create strategies to reach objectives</li> </ul>	<ul style="list-style-type: none"> <li>Design jobs and specify tasks</li> <li>Create organizational structure</li> <li>Staff positions</li> <li>Coordinate work activities</li> <li>Set policies and procedures</li> <li>Allocate resources</li> </ul>	<ul style="list-style-type: none"> <li>Lead and motivate employees to accomplish organizational goals</li> <li>Communicate with employees</li> <li>Resolve conflicts</li> <li>Manage change</li> </ul>	<ul style="list-style-type: none"> <li>Measure performance</li> <li>Compare performance to standards</li> <li>Take necessary action to improve performance</li> </ul>

**Table 2.4: Summary of the management functions and activities**

**2.6.2.7 The classification of management work.**

It would appear from table 2.4 that the activities of the planning, organising and leading functions are illogical and vary to the extent that some of them are debatable. The summary of functions and activities of the existing management practices proved that most of the elements of management work were in some or other way mentioned but it was not in a logical sequence. Some elements were missing and there was no noticeable logic. In table 2.5 it is attempted to classify management from the different views summarised in table 2.4. It is felt that insufficient logic exists and that the classification would not assist employees in understanding and applying the management principles in the practical situation. At this stage it is still perceived that the four management functions could be used to develop the logic for a comprehensive, practical and integrated management theory.

FUNCTIONS	ACTIVITIES
Planning	<ul style="list-style-type: none"> <li>- develop the vision, mission and goals</li> <li>- forecast</li> <li>- analyse the external and internal environment</li> <li>- diagnose the opportunities and threats</li> <li>- diagnose the strengths and weaknesses</li> <li>- search for opportunities</li> <li>- set and develop specific objectives</li> <li>- develop the most feasible strategies</li> <li>- prepare the strategic plan</li> <li>- prepare the necessary tactical plans</li> <li>- program activities</li> <li>- schedule activities</li> <li>- compile the budget</li> <li>- develop procedures and policies</li> <li>- monitor outcomes</li> </ul>
Organising	<ul style="list-style-type: none"> <li>- analyse the work</li> <li>- perform job description</li> <li>- organise jobs</li> <li>- determine the span of control</li> <li>- delegate authority and responsibility</li> <li>- create accountability</li> <li>- organise and coordinate work units</li> <li>- develop the organisational structure</li> <li>- coordinate the activities</li> <li>- develop relationships</li> </ul>
Leading	<ul style="list-style-type: none"> <li>- make decisions</li> </ul>

	<ul style="list-style-type: none"> <li>- motivate and communicate</li> <li>- recruit, select and place people</li> <li>- develop organisational behaviour</li> <li>- develop teamwork</li> <li>- staff, train and develop people</li> <li>- develop labour relations</li> <li>- appraise performance</li> <li>- counsel and handle conflict</li> <li>- participate</li> <li>- handle grievances</li> <li>- negotiate</li> <li>- manage change</li> </ul>
Controlling	<ul style="list-style-type: none"> <li>- establish performance standards</li> <li>- measure performance</li> <li>- evaluate performance</li> <li>- correct deviations</li> </ul>

**Table 2.5: Summary of the activities of management**

The classification of management is important since it should form the basis for analysing management work. The analysis of the management work had been attempted several times in the past. All the efforts failed to produce a result that could be applied successfully. In chapter 5 the analysis of management work would be performed by the application of the newly developed comprehensive, practical and integrated management theory.

#### **2.6.2.8 The Allen classification**

One notable effort to transform management work into a practical workable management method was proposed by Allen. In the process of developing practical applicable management development programs he experienced enormous difficulties to transform management theory into practical workable programs. In 1973 he published his book 'Professional Management: New Concepts and Proven Practices'. In this book he proposed, what he termed, a logic theme or principles of reasoning for the classification of management work (Allen, 1973:47).

##### **a) Basis of the theme.**

The theme was based on the following four steps:

- i) determine the objective and the results to be realised through the work,
- ii) identify the largest categories of work that must be performed,
- iii) define each category in the clearest and simplest terms possible, and
- iv) select a suitable semantic label for each category.

##### **b) Standards for developing the logic**

To develop this logic, he used the following two standards:

- i) the work in each category must serve to realise a common objective, and
- ii) work assigned to a specific category must as far as is practically possible be related to the other kinds of work in that category.

**c) Hierarchy for management work.**

Allen (1973:47) developed a hierarchy for management work and proposed the following set of categories:

- i) Class,
- ii) Order,
- iii) Function,
- iv) Activity,
- v) Segment, and
- vi) Element.

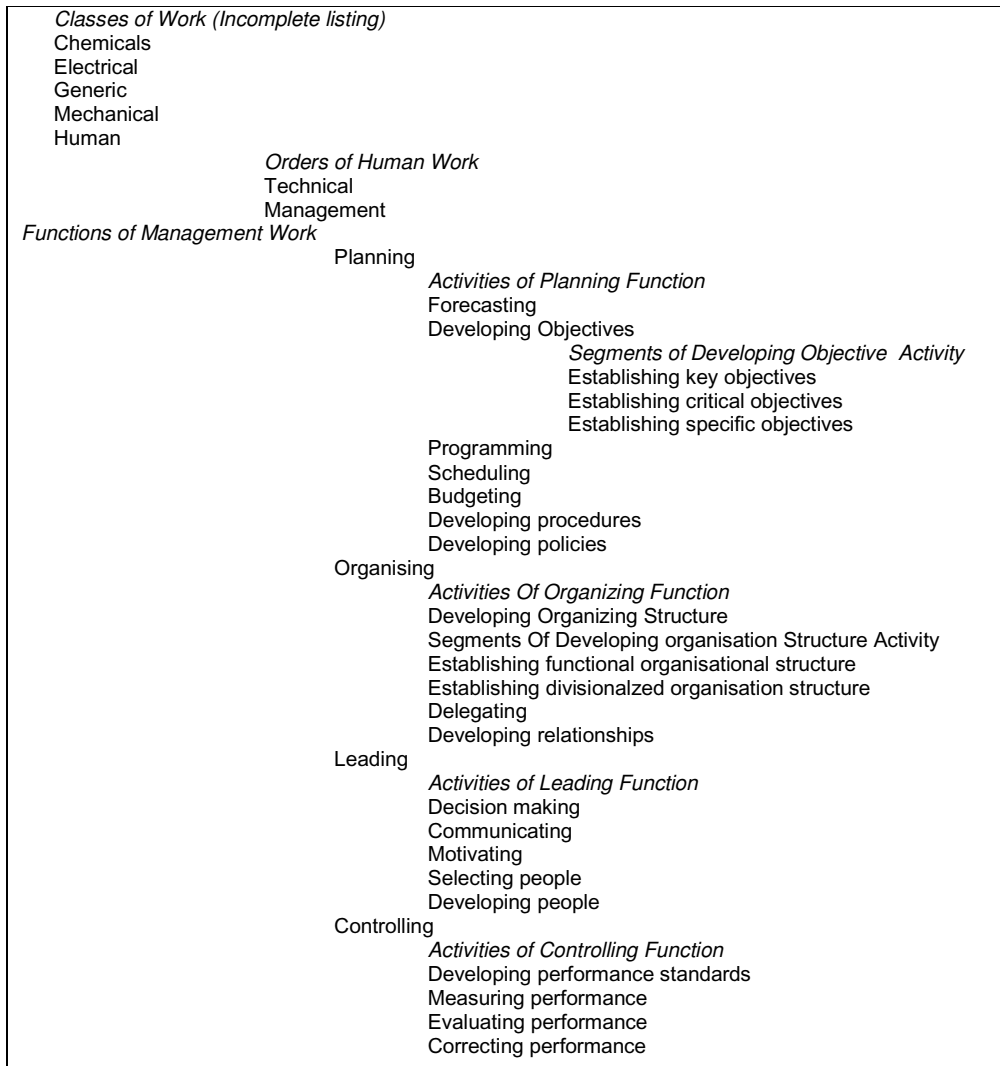
He defined work as the application of energy to realise objectives. Work is the application of energy to change the nature or condition of work in order to realise the desired objectives.

**d) The classification of management work.**

According to Allen (1973:51-53) the four management functions of planning, organising, leading and controlling constitute the functions of management work where the:

- i) planning function is the predetermining of a course of action,
- ii) organising function is the arranging and relating of work,
- iii) leading function entails influencing people to act to accomplish objectives, and
- iv) controlling function is the assessing and regulating of results.

The classification of management work by Allen does not lend itself practically useful. It is difficult if not at all impossible to develop management work in the practical situation up to the smallest task using his logic. He endeavoured to subdivide the activities into segments. His logic, however, enabled him to establish only three segments for the developing objectives and two for the developing of organisational structure activities (refer table 2.6). Thereafter it would appear that he discontinued with any further attempts to complete the exercise for the rest of the management work, possibly because his logic could not match the requirements for comprehensive management.



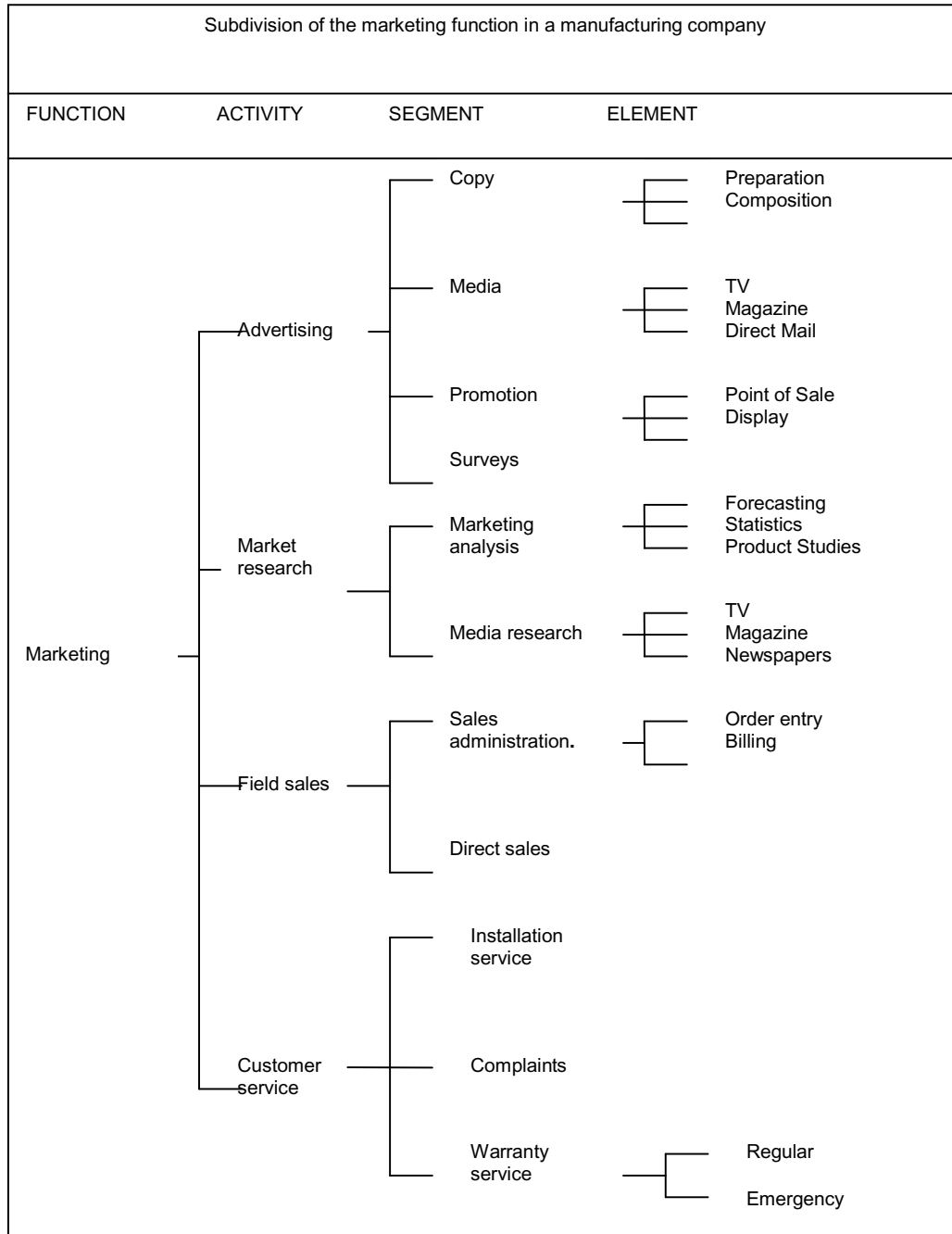
**Table 2.6: Allen’s classification of management** Allen, Fig 4.3, (1973:50)  
*A taxonomy of management work. This shows five of the categories for classifying management work: classes, orders, functions, activities, segments.*

Allen (1973:48). differentiated between human and mechanical work and defined human work as the application of a person’s mental and physical effort in order to realise objectives with the view to achieve results directly through their own efforts and indirectly through the efforts of others through the application of mental and physical effort. He defined mechanical work, as the direct application of physical and mental effort to resources to secure results by the person doing the work.

**e) Technical work**

An example of Allen’s classification of technical work is depicted in figure 2.28 below. Since technical work does not follow his standardised format, he suggested a separate classification for each enterprise.

The classification of technical functions could vary within different organisations and departments and sections of the same organisation. The variation in technical work categories, as proposed by Allen, is haphazard and illogical.



**Figure 2.28: Classification of technical work**

Source: Allen, 1973:56: Figure 4.4 Classification of technical work. This chart shows the subdivision of the marketing function in a manufacturing company (1973:560).

The development of the technical work by Allen is impractical since it:

- i) is not based on a specific logic,
- ii) is easy to make omissions during the development stage,
- iii) has no link or connection to the theoretical management work, and
- iv) would be extremely difficult for the employees to master and computerise.

It is obvious from figure 2.28 that his proposed classification of technical work is in no way practically applicable. It would not meet with the requirements of the comprehensive, practical and integrated management method. The main deficiency with Allen's management logic is that, as he said it should be objective orientated. It should serve to satisfy a main objective. The correct way would have been to commence with the results required because results required would create the needs or objectives and the objectives would dictate the work or best method required. The work would produce the results (refer figure 5.10).

## **2.7 OVERVIEW: PAST, PRESENT AND FUTURE PROSPECTS**

Today the management of many organisations utilises combinations of a variety of management practices. Many of these play in varying degrees a role in present management practices and may assist to improve managerial efficiency in some respects (Griffin, 1987:64). According to Bateman and Snell (2002:32-39) a variety of perspectives had been developed in recent years, many of which had been based on rigorous researches and related analyses. Many thousands of books on the subject of management were published in the past; some claiming to have produced the ideal comprehensive management approach. Lock and Farrow (1983:10-13) argued that it is not possible to summarise the essentials of the various approaches and general body of management knowledge into a single representative set of principles. The available management approaches are incomplete and discuss basically single topics. The real thing, that the management of today needs and was waiting for so long, the grand all-inclusive management approach or method, has as yet not materialised.

There would, however, always be management authors who would come forward from time to time with so-called 'best sellers'. Covey (1989:53) for example identified seven habits for excellence, which according to him would solve the manager's problems. In 1994 he was still battling to prove this concept's functionality by claiming that the struggle to put first things first could be characterised between employees' commitments, appointments, schedules, goals, activities and management's vision, values, principles, mission, conscience and direction (Covey et al, 1994:19). Later he stated that employees should be taught to teach themselves which in actual fact is the well-known adage by Lao Tzu, "give a man a fish and you feed him for a day; teach him how to fish and you feed him for a lifetime" (Covey, 1999:208-209). More recently he came up with yet another effort, the 8th habit that stated that the employee should find his voice and inspire others to find theirs (Covey, 2004:270).

Peters and Waterman were two of the other management authors classified under the bestseller category with their book 'In Search of Excellence' (1982:13). Blanchard and Johnson (1983:1-62) 'simplified' the ideal management practice into the application of one-minute goals, one-minute praises and one-minute reprimands. More recently Templar (2005:3) stated in his book '*The Rules of Management: A definite code for managerial success*' in which he listed 100 rules for managerial success that:

"Of course we as managers, have to work with real flesh-and-blood people and we have to know what motivates them, how they think and feel, why they come to work, why they give of their best (or their worst), what they are afraid of, what they hope and dream for. We shall have to encourage them, coach them, give them the resources to do their job and manages themselves, oversee their processes and set their strategy for them. We will worry about them, look out for them, be on their side and support them. But we won't manage them. We will let them manage themselves and we shall concentrate on our real role as a manager."

Almost each and every management theorist, to date has in some respects a different perception of the management discipline and the implementation of it in the practical situation. Most still supports the process management approach. This approach, is, however, in no way a comprehensive management method (refer section 2.5.1.1 (d)). It does not provide a logical method to apply management in the practical situation.

All approaches are in some way contributing to the understanding, utilising and practising of management. They jointly made and are still making an indispensable contribution to the improvement of production efficiency, human relations and the general prosperity of mankind. Unfortunately even jointly they do not present the management fraternity of today with a comprehensive, practical and integrated management method applicable on all the levels of the organisation. Management as a subject still receives its fare share of attention. The process of management is still not fully understood and explained in the literature.

## **2.8 CONCLUSION**

The existing relevant management literature suggests that some management theorists differed to some extent on the theory of management principles (refer section 2.6.1). The general consensus, however, was that the successful manager must perform the four management functions of planning, organising, leading and controlling of the process management approach (refer section 2.5.1.1 (d) and 2.6.2). Existing management practices should rather be seen as a result or mixture of many past management approaches (refer section 2.5.1, 2.5.2 and 2.5.3 and figure 2.11, 2.13, 2.14 and 2.16). Not one of them is based on a specific management logic. At this stage the perception is that a comprehensive, practical and integrated management method consisting of the appropriate theory and procedure does not exist.

It is perceived that the mining industry mainly utilises the administrative management approach supplemented by management programs that become available from time to time (refer section 4.2.2.1 (a) and 4.2.3.1). It is also continuously investigating new management practices and where applicable applies supplementary management theories from abroad and locally as presented by the literature, tertiary and other institutions. The existing practices by the mining industry to introduce from time to time new programs as they become available is causing a lot of confusion and resistance from the employees. In almost all cases the benefits of the introduced programs are not followed up and evaluated. The result is that great amounts of money are paid to institutions with little or no real advantages to the mining industry

Evaluated against the perceived requirements of a comprehensive, practical and integrated management method as set out in section 2.2.1 the deficiencies of the existing management literature and practices appeared to be that:

- 2.8.1 it is not possible to integrate and coordinate the four functions of the administrative management approach in practice by all employees on all the levels of the organisation with existing management practices,
- 2.8.2 a comprehensive, practical and integrated management method does not exist (refer section 1.5.1),
- 2.8.3 a comprehensive, practical and integrated management theory and procedure to implement it do not exist either (refer section 1.5.2.1),
- 2.8.4 existing management theories individually or combined appear to be inadequate to develop the theory for a comprehensive, practical and integrated management method (refer section 1.5.2.2),
- 2.8.5 existing planning processes are totally inadequate to enable management to plan comprehensively on an integrated basis on all the levels of the organisation (refer section 1.5.2.3),
- 2.8.6 it would appear that some components of the existing management theories and practices could totally or to some extent or in combinations be modified and utilised to develop the theory for a comprehensive, practical and integrated management method (refer section 1.5.2.6 and table 2.2),
- 2.8.7 the additional management theory required to develop a comprehensive, practical and integrated management method could be developed (refer section 1.5.2.7).
- 2.8.8 it would appear that existing practices are inadequate to enable managers and employees to comprehensively (refer section 2.2.1):
  - 2.8.8.1 identify deviations from planned performances,
  - 2.8.8.2 determine and forecast the most probable results,
  - 2.8.8.3 state the most probable achievable results,
  - 2.8.8.4 efficiently formulate the objectives,
  - 2.8.8.5 develop alternative methods to realise the formulated objectives,
  - 2.8.8.6 develop the tasks required for each alternative method,
  - 2.8.8.7 develop performance standards that each task should comply with,



- 2.8.8.8 analyze the tasks and establish the resources required for each task of every alternative method,
  - 2.8.8.9 determine and assess all risks,
  - 2.8.8.10 schedule the tasks and resources required for each alternative method,
  - 2.8.8.11 budget for each alternative method and select the best method,
  - 2.8.8.12 develop the necessary policies and procedures,
  - 2.8.8.13 determine the job specifications and the necessary posts,
  - 2.8.8.14 develop the organisational structure delegate accountability to each post,
  - 2.8.8.15 determine the communication lines and determine the lines of authority,
  - 2.8.8.16 create the necessary relationships among posts and levels,
  - 2.8.8.17 determine supervisory accountabilities,
  - 2.8.8.18 affect proper coordination,
  - 2.8.8.19 optimise, computerise and compile the written plan,
  - 2.8.8.20 obtain the most competent people,
  - 2.8.8.22 develop training and management development programs and schedules, and
  - 2.8.8.23 develop and maintain a logical and practical planning framework.
- 2.8.9 employees can not efficiently affect the required people actions, and
- 2.8.10 the introduction of a comprehensive, practical and integrated management method would enable all the managers and employees on all the levels of the organisation and under all circumstances to:
- 2.8.9.1 make more reasoned decisions,
  - 2.8.9.2 communicate and motivate people optimally,
  - 2.8.9.3 develop the most functional recruiting specifications,
  - 2.8.9.4 successfully recruit people with the best potential,
  - 2.8.9.5 appoint the most competent people,
  - 2.8.9.6 justly remunerate people,
  - 2.8.9.7 optimise the training and development of people,
  - 2.8.9.8 measure the actual planned performance,
  - 2.8.9.9 efficiently evaluate performance, and
  - 2.8.9.10 timeously correct deviations.

Existing management theories are inadequate to develop a comprehensive, practical and integrated management method that would enable all employees in the organisation to manage efficiently for the achievement of the results required from each of them. As a result the managerial competencies of management are unacceptably low.

The classification of the existing management theory is not based on a management logic that would allow the complete development of management work. The probability that the organising function, as it is known and applied today, should actually be one of the outcomes of the planning function is not

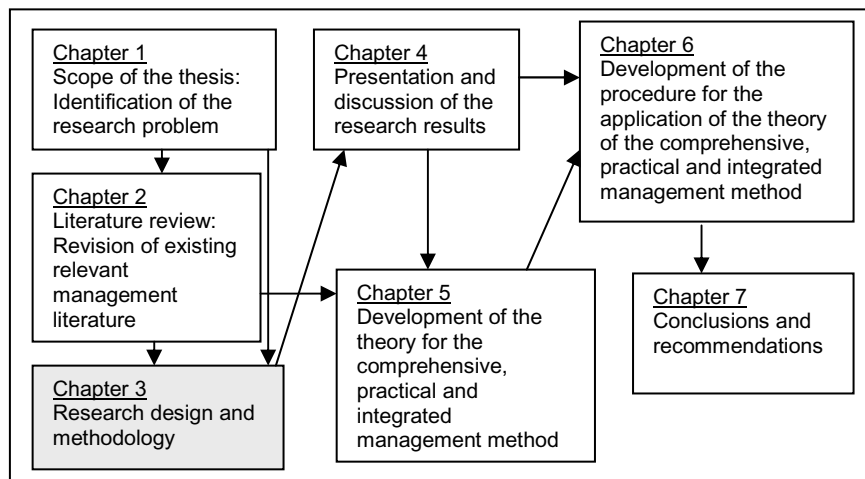
realised, understood and admitted. The leading and controlling functions are not really seen as time related functions or specific skill categories. In the next chapter an empirical research methodology would be designed in order to gather the necessary data for the assessment and evaluation of the management practices and managerial knowledge and competency of management in the South African mining industry.

## CHAPTER 3

### RESEARCH DESIGN AND METHODOLOGY

#### 3.1 INTRODUCTION

In the previous chapter it was concluded that a comprehensive, practical and integrated management method and an integrated management planning process and planning structure could not be confirmed from existing management literature (refer section 2.8.2 and 2.8.5). It also appeared that serious deficiencies with respect to the present management practices and planning theories existed. It was concluded that each management practitioner utilised to some extent a personal preferred management practice. It became necessary to establish what the status of the management practices in the South African mining industry was. In chapter 1 it was perceived that the required empirical research and the methodology to affect the research could be designed and developed respectively (refer section 1.5.2.4).



**Figure 3.1: Chapter 3 in context to the overall thesis**

In this chapter the most suitable empirical research to facilitate the practical collection of the required data was designed. The required methodology was developed in order to accommodate all physical conditions, requirements from the potential respondents and mining groups in the South African mining industry and the requirements of the empirical research. It dealt with the type of data required, the sources of the data and the area to be covered by the research. The sampling methods and design were specified. The questionnaires and the assessment criteria used in order to obtain the necessary data with the minimum disruption and inconvenience to the mining industry were designed and motivated. The methods to gather the data were developed and the possible restrictions from the potential participating mining groups, mines and respondents were identified and evaluated.

The results of the research were evaluated and assessed. The conclusions played an indispensable role in the design and development of the comprehensive, practical and integrated management theory and the procedure to implement the theory in the practical situation on all the levels of the mining industry.

### **3.2 OBJECTIVES WITH THE EMPIRICAL RESEARCH**

The objectives with the empirical research were to establish:

- 3.2.1 which management practices are predominantly being utilised in the South African mining industry,
- 3.2.2 the deficiencies with existing management practices as perceived by management and the proposed suggestions to rectify it,
- 3.2.3 which planning processes are being utilised,
- 3.2.4 whether a comprehensive, practical and integrated management method does exist in the industry, and
- 3.2.5 the state of managerial competencies with respect to the comprehensive application of the main management functions of planning, organising, leading and controlling in the industry.

### **3.3 MOTIVATION FOR THIS RESEARCH**

Since its inception the South African mining industry had continuously developed and introduced more efficient technical mining and management methods in order to efficiently manage the industry-specific environmental factors and challenges, increasing complex geological conditions, labour demands, local and global competition, fluctuations in the R/\$ exchange rate and rocketing input commodity prices. In addition skills shortages, increasing social commitments, new laws, mandatory black economic empowerment and inadequate infrastructure were placing extraordinary demands on the managerial skills of the mine personnel.

The Chamber of Mines (COM, Annual Report, 2004-2005:14) emphasised the importance of the mining industry as the largest industry sector in the country to the employment, economy and development of South Africa (refer section 1.2.7.2). The industry developed a high degree of technical expertise and the ability to mobilise large amounts of capital for the development of new projects (DME, South Africa's Mineral Industry, 2004/2005:1).

The industry's favourable position as a cheap supplier of various minerals to world markets was lately, due to its unsatisfactory performance, deteriorating rapidly (COM, Annual Report, 2004 - 2005:22). This was further aggravated by unexpected restrictions on the consumption of electrical energy and water, unannounced cut-offs of electricity, limited generation capacities, tightening of environmental management laws, increasing global interest and investment and changes and challenges of new and revised mineral acts and the future decreasing competitiveness and survival of the industry (COM, Annual Report, 2004 – 2005:30-83).

### **3.4 TYPE OF DATA REQUIRED**

The data required should enable the researcher to realise the objectives set out in section 3.2. The main prerequisite of the required data was that it should enable the researcher to investigate, analyse and evaluate the state of existing management practices, planning processes, management deficiencies, the knowledge and competencies of management with respect to the requirements of the comprehensive, practical and integrated management method and to arrive at meaningful judgements and conclusions (refer section 2.2.1 and 2.8).

### **3.5 SOURCES OF THE DATA**

The data gathering was performed in the South African mining industry on a representative number of groups and mines (refer table 1.1 and section 3.6). It collected the appropriate data in order to evaluate the efficiency of the Mine Manager's Certificate of Competency (MMCoC) and the general predominant management practices being utilised in the mining industry. The motivation for assessing the Mine Managers Certificate of Competency was because it is, according to Regulation 28.13.1 - 28.16.3, a mandatory statutory required qualification suitable to manage a mine, part of a mine or works. In addition it is the predominant technical and management qualification of most mine managers in the South African mining industry (refer Mine Health and Safety Act, Act 29 of 1996:28-2). The reason for also enquiring on general management in the mining industry was to specifically obtain the responses from mining graduates having to succeed the legal part of the Mine Manager's Certificate of Competency only. These two categories of employees represent the main management levels in the mining industry (refer section 4.3.8.1 and table 3.1). It would include management positions from the Chief Executive Officer to the relative junior personnel qualified and registered as members of the mining associations. The assessments would enable the researcher to arrive at the most meaningful judgments and conclusions. It was then used in the development of the theory for a comprehensive, practical and integrated management method and for the development of a procedure to practically implement the theory in the South African mining industry.

### **3.6 AREA TO BE COVERED BY THE SAMPLE**

The researches focused mainly on the following mining sectors (refer section 1.2.4 and table 1.1):

- Gold mining sector,
- Coal mining sector,
- Platinum group of metals (PGMS) mining sector,
- Iron and ferrous mining sector,
- Chromium mining sector,
- Manganese mining sector,
- Diamond mining sector,
- Copper mining sector, and
- Other mining sectors.

### 3.7 DETERMINATION OF THE SAMPLING METHODS

The purposive and simple random sampling designs were planned for this study. The purposive sample design was intended for the total sample population whilst the simple random sample design was intended for a random selected number of the sample population selected by a suitably qualified independent consultant.

#### 3.7.1 The purposive sample design

It was planned to obtain the data from the registered members of the South African Colliery Managers Association, Association of Mine Managers of South Africa and the Northern Cape Mine Managers Association. There was the probability that some mining groups may refuse to release the names and addresses of their senior personnel to unauthorised entities. Some companies also have policies that prohibit the disclosure of information to any outside investigations (refer section 3.10.3).

The author of this thesis was convinced that the majority of the managers, however, would have access to the research. The sample consequently constituted an infinite sample. It was felt that the infinite sample would be representative of the views of management on all the levels in the South African mining industry.

Kothari (1990:19) defined the purposive sampling design as follows:

“This sampling method involves purposive or deliberate selection of particular units of the universe for constituting a sample which represents the universe.”

The sampling methodology was a plan of action that endeavoured to realise the objectives as set out in section 3.2. The sample was designed to obtain as many responses as practically possible with the most relevant information possible. The information would enable the researcher to arrive at the most meaningful judgments and conclusions.

Kothari (1990:18) defined sample design as:

“a definite plan determined before any data are actually collected for obtaining a sample from a given population.”

The potential available number of names and addresses of members registered at the three mine managers' associations was 245. It was highly probable that, for various reasons, some of these members would not participate in the sample (refer section 3.10).

### **3.7.2 The simple random sample design**

From similar previous research it was experienced that respondents generally were inclined to rate their managerial knowledge and competencies much higher than what they actually were (refer section 4.4.15, 4.4.16 and 4.4.17). Because of this phenomenon the researcher decided to apply the simple random sample design to select a predetermined population from the main population sample in order to verify the assessments as accurately as practical possible.

The assessments of each of these selected population respondents would be discussed with each of the respondents separately in order to establish a more realistic assessment. The difference, between the respondents' and the researcher's assessments, expressed as a percentage, was accepted as representative of the managerial competency gap of the sample.

## **3.8 QUESTIONNAIRES USED**

Five different questionnaires, one for each management level in the mining industry, were designed and utilised. The questionnaires were designed to realise the research objectives (refer section 3.2). Each question served to obtain specific information. The responses would enable the researcher to carry out the necessary evaluations.

### **3.8.1 Initial study**

Initially the research was aimed at the five main management levels in the mining industry (refer appendices 1 to 5). It was reasoned, at the time, that the more information gathered the better conclusions could be arrived at. A questionnaire for each level was designed with the main objective to determine to what extent mine management in the South African mining industry understand and was competent in applying comprehensive, practical and integrated management principles. The number of questions for each questionnaire was different. The questions were designed to be representative of the information logically applicable to that management level (refer table 3.1).

The request was that the head offices should distribute the appropriate questionnaires to the specific managers in their groups. The response was extremely disappointing. One group outright refused to respond at all to e-mails from non-company associated organisations requesting personal and sensitive information from the group. Only three half completed responses out of an estimated 1 200 potential responses were eventually received.

The researcher arranged and held individual discussions with some of the most senior mine executives of the largest mining groups. Each stated that the proposed questionnaires were much too lengthy and preferably should not consist of more than fifty questions each. The main objection was that the personnel would not always understand what was required with some questions and they simply could not afford to spend too much time on a questionnaire. Concern was also

expressed on the effectiveness of the Mine Manager’s Certificate of Competency and the planning processes available and utilised by the mining industry.

Management level	Number of questions
Chief executive level	60
Head office executive level	126
Mine executive level	148
Mine management departmental level	145
Mine management sectional level	119

**Table 3.1: Number of questions per management level**

The executives felt that:

- the certificate was an outdated generalised technical and management qualification,
- it does not fulfil in the managerial needs of modern mining personnel, and
- the technical and management parts should be presented as totally separate courses.

The main requests of these senior executives were that the questionnaires should be designed so that the specific questions should:

- be clear, brief and specific,
- still ensure an accurate assessment of the specific management practices in use in the South African mining industry,
- enable the assessment of the Mine Manager’s Certificate of Competency,
- enable the assessment of the other management practices in use in the South African mining industry where appropriate, and
- enable the researcher to evaluate the managers’ competency in the application of the requirements of the comprehensive, practical and integrated management method.

### **3.8.2 Redesign of the questionnaires**

Following the discussions with the senior executives mentioned in section 3.8.1 the researcher compiled two questionnaires. Each questionnaire consisted of 30 questions (refer appendices 7 and 8). One questionnaire was for management members who are the holders of the Mine Manager’s Certificate of Competency and the other one for graduated managers. The research essentially focused on mine management only. This is not to say that the rest of the employees in the organisation do not need to manage. The contrary is true – each employee needs to manage for the achievement of the results required from him. Right through this thesis it was assumed that management practices are applicable not only to management but to all employees employed in the South African mining industry.



The motivation for selecting the management levels in the industry was simply for the following practical reasons:

- the population was available,
- potential respondents have generally access to electronic communication media,
- each one had to succeed specific prescribed management training,
- each one is or was exposed to management responsibilities, and
- it would be more practical to contact respondents where and when required.

The assessment of management would be regarded as representative of the total management situation in the mining industry. A short cover letter explaining the purpose of the questionnaire was attached to each questionnaire.

As it could become necessary to clarify some of the answers to some questions potential respondents were requested to state their names, position/title, mine, company/group, minerals mined and contact addresses only. Participation was on a voluntarily basis and confidentiality was guaranteed at all times.

#### **3.8.2.1 The Mine Managers Certificate of Competency**

Of these respondents it was required to indicate to what extent the management theory of the Mine Manager's Certificate of Competency, enables them to efficiently perform the management work required in their managerial positions. The assessment scale proposed in section 3.8.3.1 was utilised.

#### **3.8.2.2 General management**

The academic training of mining graduates was regarded as more advanced than the technical training required by the Mine Managers' Certificate of Competency. They, therefore, needed only to succeed the legal requirements specified in the curriculum of the Mine Managers Certificate of Competency. From this category of employees it was required to indicate to what extent the management approach that they use enabled them to efficiently perform the management work required in those positions.

Each respondent had to:

- indicate whether or not the management approach that he and the mine utilises mainly consists of the management functions of planning, organising, leading and controlling, and
- briefly specify and describe the approach that he and the mine utilises in the event that the approach mentioned above is not utilised.

### 3.8.3 Assessment

As the questions and answers were expected to be to a large extent subjective it was deemed more practical to make use of an assessment scale that could most efficiently accommodate subjectivity. The scale was designed to be easy to use and to enable the researcher to arrive at acceptable accurate conclusions and judgments (refer section 3.8.3.1).

#### 3.8.3.1 Assessment scale

In the use of the assessment scale the following values were applicable:

- a) Column 0 = No/Not/Never,
- b) Column 1 = Seldom,
- c) Column 2 = Sometimes,
- d) Column 3 = Most of the time, and
- e) Column 4 = Yes/Always.

#### 3.8.3.2 Example

The following example serves to explain how the potential respondent should use the assessment scale:

Question: I give the correct instructions.

0	1	<del>2</del>	3	4
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Responsive answer: The respondent is then saying, "I sometimes give the correct instructions."

It was expected that respondents may not have adequate theoretical management knowledge and as a result might experience difficulty in interpreting the questions correctly. The researcher therefore, decided to conduct structured interviews with a random selected number of respondents.

#### 3.8.4 Classification of the questions

The designed questionnaires covered the four management functions. The four main functions were represented in the questionnaires as follows:

- the planning function by questions 1 - 12.
- the organising function by questions 13 - 22.
- the leading function by questions 23 - 24.
- the controlling function by questions 25 –28.

Since the total number of questions were limited and that it was perceived by the researcher, at that stage, that the tasks or activities of the leading function are intertwined with that of the organising function only two questions on this function were included in the questionnaires (refer table 3.3

questions 13, 14, 15, 17, 18, 19, 20, 21, 22, 23 and 24). The two questions: selection of the most competent people and the development of the necessary training and development schedules were included as separate questions in order to obtain a reasonable complete picture of this management function. It was assumed that the other leading activities would be performed as a logical execution of the other three management functions.

### 3.8.5 The pilot study

In order to test the suitability of these questionnaires a pilot study was carried out. A number of member names were selected at random and used in the pilot study. This time the membership lists of the various mining associations were used because:

- members would be either holders of the Mine Managers Certificate of Competency, a degree in mining engineering, a degree in management or a combination of these, and
- better control and follow-up could be exercised by the researcher.

Qualification	Questionnaires		
	Send	Received	Percentage received
Mine Manager's Certificate of Competency	26	24	92.3
Graduate Manager	10	4	40.0
Total	36	28	77.8

**Table 3.2: The results of the pilot study**

A return rate of 77.8 per cent was achieved. This rate was deemed to be acceptable. It should give a true reflection of the reality as far as management knowledge, the application of management principles and the proficiency with respect to the knowledge of comprehensive management principles were concerned. The questionnaires were therefore used in the study.

### 3.8.6 The simple random selected sample

In chapter 1, it was stated that as a result of the lack of a comprehensive, practical and integrated management theory, the managerial competencies of employees on all organisational levels in the mining industry were, generally unacceptably low (refer section 1.5.2.5). The objective with this section was to establish the management competency in the industry.

An independent institution selected this sample. The methods used complied with acceptable academic and managerial policies. Only after the random selected sample had been established the researcher continued with the discussions. The discussions were conducted with the assessment criteria stated in table 3.3 as guidelines.

### 3.8.7 Personal discussions

The personal discussions ensured that a more objective assessment of the managerial competencies of the selected sample of respondents could be ascertained. This established an acceptable accurate basis for evaluation purposes and the development of the theory for a comprehensive, practical and integrated management method.

The discussions concentrated on the specific questions as set out in the questionnaires (refer table 3.3 and appendices 7 and 8). Through the discussions it was possible to determine reasonably accurately if respondents rated their managerial competencies higher than what they actually were and to what extent respondents generally were inclined to overrate their managerial competencies.

After the researcher had established, according to his judgement, what the respondent's actual understanding of a specific question was he rated the respondent's competency on that specific question. This assessment enabled the researcher to establish the management competency gap for the mining industry as a whole (refer section 4.3.10.3, table 4.15 and figure 4.17).

The researcher was confident that the discussions did not only reveal to what extend the specific respondent overrated his managerial competency but in addition gained a lot of useful information on the way management principles were interpreted. In the practical situation the information would enable management to establish the management competency gaps and which management development programs would be required to sufficiently close these gaps.

#### 3.8.7.1 Assessment criteria

In order to facilitate the evaluation procedure assessment criteria were suggested for each question during the personal discussions (refer table 3.3). The criteria were used by the researcher to conduct a meaningful and structured and representative interview with each selected respondent. This procedure ensured a more accurate, uniform and representative assessment of the respondent's understanding of a comprehensive, practical and integrated management theory. It in addition gave a more accurate picture of existing management practices being utilised.

Questions	Assessment criteria
1. Forecast the most probable results	1.1 An integrated planning structure exists for the whole organisation. 1.2 The reporting system ensures that the responsible stakeholders pick up events necessitating action. 1.3 These events trigger the planning process. 1.4 Stakeholders investigate and analyse factors involved. 1.5 Each stakeholder estimate and forecast the impacts of these factors on his required results. 1.6 Each stakeholder then determines and forecasts the most probable results that he could realistically deliver. 1.7 The most modern forecasting techniques are employed.

2. State the most probable achievable results	<p>2.1 Stakeholders jointly discuss the most probable results.</p> <p>2.2 Each stakeholder adjusts his most probable results where necessary.</p> <p>2.3 Each stakeholder determines whether he could make the required contribution to the achievement of the most probable achievable result.</p> <p>2.4 Stakeholders jointly discuss and agree on the most probable achievable results.</p>
3. Formulate the realisable objectives	<p>3.1 Each stakeholder formulates his preliminary objective.</p> <p>3.2 The stakeholders then discuss their objectives with their subordinates.</p> <p>3.3 Each stakeholder then reaches agreement with his subordinates on his most realisable objective.</p> <p>3.4 The stakeholders then jointly discuss their most realisable objectives.</p> <p>3.5 Where necessary stakeholders make adjustments and finalise their most probable realisable objectives.</p>
4. Develop alternative methods	<p>4.1 Each stakeholder develops the most realistic alternative methods with which to realise his objective.</p> <p>4.2 Each stakeholder then discusses these alternative methods with his subordinates.</p> <p>4.3 Each stakeholder sets the results to be achieved as provisional selection criteria.</p> <p>4.4 Each stakeholder together with his subordinates jointly selects the three to five best alternatives.</p> <p>4.5 The stakeholders thereafter discuss these alternatives with their superiors and get approval to use that for planning.</p>
5. Develop the work flow for each alternative method	<p>5.1 For each alternative method each stakeholder must:</p> <p>5.1.1 Commence with the most probable achievable results,</p> <p>5.1.2 Write down the most realisable objective.</p> <p>5.1.3 Develop one of the selected alternative methods into main tasks,</p> <p>5.1.4 State the results required (performance standards) for each main task,</p> <p>5.1.5 Define the objective for each main task,</p> <p>5.1.6 Develop each main task into supporting tasks,</p> <p>5.1.7 State the supporting tasks in a practical logical sequence,</p> <p>5.1.8 State the results required (performance standards) for each supporting task,</p> <p>5.1.9 Define the objective for each supporting task,</p> <p>5.1.10 Develop each supporting task into controlling tasks,</p> <p>5.1.11 Develop tasks further where necessary until the end tasks are identified.</p>
6. Determine the task and resources for each alternative	<p>6.1 Each stakeholder must determine during the task and resources analysis the:</p> <p>6.1.1 Resources such as tools, equipment, materials etc,</p> <p>6.1.2 Labour (employees),</p> <p>6.1.3 Working cost per task,</p> <p>6.1.4 Capital requirements per task,</p> <p>6.1.5 Start, finish and duration time per task,</p> <p>6.1.6 Performance standards applicable to the specific task,</p> <p>6.1.7 Possible deviations,</p> <p>6.1.8 Possible consequences,</p> <p>6.1.9 Risks,</p> <p>6.1.10 Corrective measures,</p> <p>6.1.11 Supervisory control, and</p> <p>6.1.12 Design and development of the organisation structure.</p>
7. Schedule the work flow for each alternative method	<p>7.1 The tasks of each alternative method are scheduled.</p> <p>7.2 The task duration times are optimised.</p> <p>7.3 Optimal critical path schedules are determined.</p> <p>7.4 The total time of each alternative is determined.</p> <p>7.5 The most optimal critical paths are selected.</p> <p>7.6 Tasks are coordinated and integrated with that of the related stakeholders.</p>
8. Compile the budget for	<p>8.1 Include all the required resources in the budget.</p>



each alternative method	<p>8.2 Each employee compiles his own budget.</p> <p>8.3 Budgets are integrated and coordinated.</p> <p>8.4 The budget is delegated and authorised.</p> <p>8.5 The budget is expressed in resource units and finally in monetary terms.</p>
9. Select the best method	<p>9.1 State the original results required as selection criteria.</p> <p>9.2 Specify the possible adjusted selection criteria.</p> <p>9.3 Evaluate the developed alternatives.</p> <p>9.4 Select the best alternative method.</p>
10. Determine and assess all risks	<p>10.1 Determine risks involved with tasks, tools, equipment, materials and internal and external factors.</p> <p>10.2 Determine the risks of operational practices.</p> <p>10.3 Determine the risks involved with policy setting.</p> <p>10.4 Determine and assess political related risks.</p> <p>10.5 Eliminate where practical all high risks.</p> <p>10.6 Where not possible to eliminate risks compile procedures to efficiently manage it.</p>
11. Develop the necessary policies and procedures	<p>11.1 Identify areas where policies and procedures are required.</p> <p>11.2 Compile procedures to manage unavoidable risks.</p> <p>11.3 Compile procedures for training and development.</p> <p>11.4 Compile procedures for the coordination of interdepartmental cooperation.</p> <p>11.5 Compile procedures and policies to ensure coordination and integration of tasks and activities.</p> <p>11.6 All policies and procedures are compiled with the necessary involvement of the relevant stakeholders on every level.</p>
12. Computerise the total plan	<p>12.1 Each stakeholder:</p> <p>12.1.1 Has a planning structure</p> <p>12.1.2 Ensures the complete integration and coordination of all planning in his department or section</p> <p>12.1.3 Ensures the codification of all items on the task and resources analysis plan sheet.</p> <p>12.1.4 Ensures the delegation and authorization of each plan.</p> <p>12.1.5 Computerises each plan.</p> <p>12.1.6 Coordinates and integrates with all relevant employees.</p> <p>12.1.7 Integrates all the plans.</p> <p>12.1.8 Integrates the total plan and that of all stakeholders, and</p> <p>12.1.9 Ensures that all plans are integrated and coordinated.</p>
13. Determine the job specifications or requirements	<p>13.1 Identify the tasks supporting the same objective.</p> <p>13.2 Add up the times of the tasks.</p> <p>13.3 List these tasks for the post.</p>
14. Develop the necessary posts	<p>14.1 Use eight hours per day to constitute for shift duration.</p> <p>14.2 Develop the necessary posts.</p> <p>14.3 Group the posts to form sections, departments and finally the total organisation.</p>
15. Delegate accountability to each job	<p>15.1 Establish the authority per post.</p> <p>15.2 Delegate the work (post) to the most competent employee.</p> <p>15.3 Delegate the necessary authority.</p> <p>15.4 Create accountability.</p>
16. Develop the optimal organisational structure	<p>16.1 Combine posts to constitute a section supporting a specific objective.</p> <p>16.2 Combine sections to form departments supporting a specific objective.</p> <p>16.3 Combine departments to form the organisation.</p>
17. Determine the lines of authority	<p>17.1 Develop superior – subordinate authority relationships.</p> <p>17.2 Develop peer authority relationships.</p> <p>17.3 Develop interdepartmental authority relationships.</p> <p>17.4 Develop functional authority relationships.</p>
18. Determine	<p>18.1 Develop superior – subordinate communication lines.</p>

communication lines	18.2 Develop peer communication lines. 18.3 Develop interdepartmental communication lines. 18.4 Develop functional communication lines.
19. Create the necessary relationships amongst posts	19.1 Create superior – subordinate relationships. 19.2 Create peer relationships. 19.3 Create interdepartmental relationships. 19.4 Create functional relationships.
20. Affect proper coordination	20.1 Always keep the stakeholders adequately informed. 20.2 Synchronise the operations of all departments. 20.3 Involve all in the planning for the results required from each of them. 20.4 Inform stakeholders where appropriate of opportunities and threats.
21. Determine supervisory schedules.	21.1 Prepare supervisory schedules from the task and resources analysis. 21.2 Specify the type of inspections necessary. 21.3 Specify inspection intervals.
22. Determine supervisory accountabilities	22.1 Delegate supervisory responsibilities. 22.2 Create supervisory accountabilities. 22.3 Institute periodic follow-up.
23. Select the most competent people available	23.1 Compile post specifications. 23.2 Advertise for the required personnel. 23.3 Interview most suitable applicants. 23.4 Select the best applicants. 23.5 Appoint the selected applicants. 23.6 Develop skills where required.
24. Develop training and management development schedules	24.1 Compile development programs. 24.2 Develop training and development schedules. 24.3 Implement training and development schedules.
25. Develop the necessary performance standards for each task.	25.1 Establish the results required with each task. 25.2 Utilise these results required as the performance standards.
26. Measure work in progress and completed.	26.1 Use the appropriate inspection schedules. 26.2 Measure the work in progress or completed. 26.3 Record measurement.
27. Evaluate performance	27.1 Identify significant deviations or expectations. 27.2 Evaluate the impact of these exceptions. 27.3 List exceptions that need to be corrected.
28. Correct deviations	28.1 Compile plans to correct exceptions. 28.2 Implement these plans. 28.3 Follow up on progress and results achieved with the corrective action plans.
29. List main deficiencies of management theory.	29.1 Respondents to evaluate existing management theory against what they feel they require at present. 29.2 List the perceived deficiencies.
30. List suggestions to eliminate deficiencies	30. 1 Respondent proposes improvements. 30.2 Motivate the proposals.

**Table 3.3: Assessment criteria of questions**

### 3.8.7.2 Assessment criteria in relation to the four management functions

Out of a total number of 135 criteria listed in table 3.3 the greatest number of criteria were with respect to the planning function (refer table 3.4). The number of questions was based on the concerns of the senior mining executives with regard to the number of questions for the

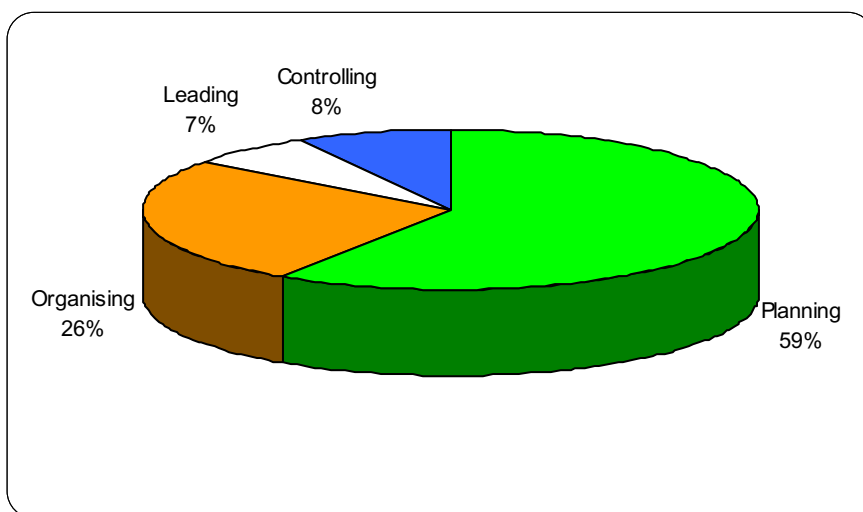
questionnaires and the researcher’s judgment as to which questions to use for the gathering of the required perceived information to analyse the management practices and competency of the respondents in the research population. It can not be taken as absolute but do give a valuable indication of the relative values of the management functions (refer section 2.6.2.1, figure 3.2 and table 3.3 and 3.4).

Management function	Number of criteria	Percentage
Planning	80	59.26
Organising	35	25.93
Leading	9	6.67
Controlling	11	8.14
Total	135	100.00

**Table 3.4: Relative values of the management functions**

The tendency reflected in table 3.4 supported the views of the importance of the planning function of many management theorists and practitioners. The value of the number of criteria per management function was reflected in figure 3.2. It confirmed that the criteria of the planning function (59.26 %) comprised the majority of the criteria of the four management functions. This indicated to what extent the planning function forms part of management work at present (refer section 2.6.2.1 and table 3.3).

A more accurate assessment of the relative values of the management functions should be determined during the development of the theory for the comprehensive, practical and integrated management method in chapter 5 of this thesis. It is perceived at this stage that the planning function would remain the dominant component of management work.



**Figure 3.2: Relative values of the management functions**



### **3.9 GATHERING OF THE DATA**

#### **3.9.1 Period over which the data was gathered**

It was planned to gather the required data during the period of October 2004 to April 2005. This would afford the researcher adequate time for possible enquiries and investigations where necessary.

#### **3.9.2 Methods to gather the data**

The methods of sending questionnaires to potential respondents and conduct personal discussions with a random selected group of the respondents were used as the two main methods of collecting the necessary data. These two methods were deemed as adequate to gather the required data.

The questionnaires were e-mailed to all registered members of the South African Colliery Managers Association, Association of Mine Managers of South Africa and the Northern Cape Mine Managers Association. The contact addresses were obtained from the relevant professional mine managers' associations. The method of collecting the required data by means of e-mailing the questionnaires was in recent times regarded as the most extensively used sampling method in research. This method was relatively cheap, fast, reliable and facilitated the electronic processing of the completed questionnaires. It would ensure an acceptable statistical analysis and evaluation of the data. It would, where and when necessary, enhance the quick clarification of possible ambiguities and queries with regard to specific questions (Kothari, 1990:22).

### **3.10 PROBABLE RESTRICTIONS TO THE EMPIRICAL RESEARCH**

It was likely that the workload of and pressure on mining personnel would continue to increase in the future. As a result it was expected that:

- 3.10.1 responses to requests for information could be rejected outright,
- 3.10.2 permission for access to the various institutions, facilities and organisations could be limited or denied,
- 3.10.3 company policies on secrecy might limit the quantity as well as the quality of information,
- 3.10.4 people might be reluctant to reveal some of the data for the research,
- 3.10.5 companies would want to screen and withhold certain vital information, and
- 3.10.6 participating institutions might demand exclusive rights to the utilisation of the proposed comprehensive, practical and integrated management method.

The mining industry had always been a close society well known for its supportive and cooperative approach to mutual challenges. There was good reason to believe that the potential participating entities would cooperate to the extent that adequate quantity and quality information would be gathered. It was felt that the probability of all of the above restrictions materialising in the industry as a whole would be relatively small and remote.

### 3.11 CONCLUSION

In this chapter the research methodology to establish the state of the utilisation of management practices in the practical situation and the managerial competencies of management was designed.

It was felt that the methodology would enable the researcher to gather sufficient data to:

- determine which management practice or practices were predominantly being utilised,
- assess the managerial competency of management in the industry,
- establish what, to the judgment of the respondents, were the most significant deficiencies of existing management practices being utilised,
- obtain suggestions from the respondents how to improve the managerial deficiencies, and
- enable the researcher to establish the deficiencies of the management practices and management as a whole in the practical situation.

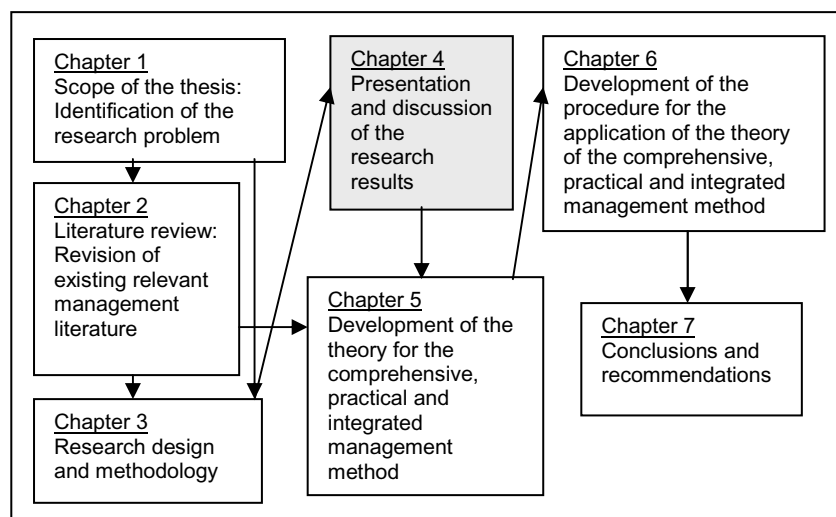
The results obtained with the gathering of the required data would be presented, prepared, evaluated and discussed in the next chapter. The conclusions arrived at together with the deficiencies identified in chapters 1, 2 and 4 would be utilised in the development of the theory and the planning process for and the procedure for the implementation of the comprehensive, practical and integrated management method.

## CHAPTER 4

### PRESENTATION AND DISCUSSION OF THE RESEARCH RESULTS

#### 4.1 INTRODUCTION

In this chapter the results received, the deficiencies, the suggestions from the respondents to improve management practices in the South African mining industry and the observations and conclusions, arrived at by the researcher during the discussions with the respondents of the random selected sample were discussed in detail. All the data were presented, prepared and evaluated in terms of the requirements of the perceived comprehensive, practical and integrated management requirements (refer section 2.2.1).



**Figure 4.1: Chapter 4 in context to the overall thesis**

The management competency of management in the South African mining industry was determined and assessed. For purposes of assessment a competency standard of 85 per cent was proposed. Management competency is defined as the degree of proficiency of the employee in understanding and applying the perceived comprehensive, practical and integrated management theory in his own practical situation.

It was emphasised that the competency standard applied by the specific organisation was a matter of choice that it has to make. It might initially have been difficult to train, improve and maintain the competency level of all the employees to comply with this standard but the lower the selected competency standard the higher the risk of not being competitive in the global market arena. The conclusions arrived at together with existing management theory were utilised in developing the theory for the comprehensive, practical and integrated management method.

## **4.2 PRESENTATION OF THE RESEARCH RESULTS**

### **4.2.1 Responses received**

Questionnaires were e-mailed to a total of 245 members of the three mine managers' associations (refer section 3.9.2). A total of 164 (66.94 per cent) responses were received within the planned period of October 2004 to April 2005 (refer table 4.1). By mid April 2005 the return rate of the responses decreased rapidly and completely ceased towards the end of that month.

### **4.2.2 The deficiencies identified and the suggestions proposed by the respondents**

The respondents' perceptions of the deficiencies of the existing management practices and their suggestions to rectify these deficiencies and the deficiencies as measured by the researcher were summarised below. It should by no means be considered as complete but did reflect an acceptable representative assessment of the existing management practices in the South African mining industry.

#### **4.2.2.1 Deficiencies as identified by the respondents**

The perceived deficiencies with the existing management practices in the South African mining industry and the suggestions proposed by the respondents to rectify these deficiencies were listed in the sections below. They are categorised as follows:

##### **a) Management programs**

- i) Management endeavoured to accommodate managerial needs almost entirely by short duration, single-topic management programs,
- ii) Many programs were not entirely based on management theory.
- iii) Many programs were not practical to implement.
- iv) These programs were not comprehensive and almost without exception intended for line management only.
- v) Too many different programs caused confusion and resistance by the employees.
- vi) The administrative management approach was not comprehensive and practically applicable as an integrated program.

##### **b) Management planning**

- i) The present planning structures were not complete, logical, integrated and comprehensive enough.
- ii) Comprehensive planning processes did not exist.
- iii) Not all the employees on all the levels of the organisation were involved in the planning of the results required from each of them.

- iv) No logical step by step breakdown of work tasks was performed by the responsible employees anywhere in any of the mining organisations.
- v) Time and method studies were seldom conducted and when mainly by dedicated technical staff with special projects in departments and sections.
- vi) Top management and the technical departments mostly specified the performance standards that the employees have to comply with.
- vii) Workers were not trained and allowed to set the standards applicable to their own work themselves.
- viii) Workers did not always sufficiently know and understand the objectives and results required from each of them.
- ix) Special trained staff departments mainly carried out risk assessments.
- x) Budgets were mostly updated and escalated versions from the previous year.
- xi) Risk assessments were performed by a separate department, mostly on an ad hoc basis or because of special requests.
- xii) When risk assessments were performed it was mainly carried out by a specific dedicated department.

### **c) Organising**

- i) Organisational structures could not be scientifically designed.
- ii) Existing organisational structures were mostly carry-overs from other similar organisations.
- iii) Logical scientific methods for developing organisations did not exist.
- iv) Relationships were not adequately determined and developed.
- v) It was not possible to develop job descriptions correctly with existing management approaches.
- vi) Very few employees understood what coordination means, what it implied and how it should be affected.

### **d) Leading**

- i) Motivation was low because existing management practices largely ignored leadership theories.
- ii) Leadership programs were presented on an ad hoc basis only.
- iii) As a result of the incomplete organisational development it was basically impossible to communicate efficiently with all the relevant stakeholders.
- iv) Not all subordinates were allowed to take the decisions necessary to achieve the results required from them.
- v) Discipline and authority were adversely affected by head offices' appeasement approach to unions.

### **e) Controlling**

- i) Performance standards were not set from the top down for each level of the organisation.
- ii) Performance levels were not scientifically established.

- iii) Management seldom controlled by exception.
- iv) Physical controlling methods on the lower levels were strict and generally of a high standard.
- v) Specific staff departments normally developed performance standards for all the employees.

#### **f) The Mine Managers' Certificate of Competency**

- i) It was too technically orientated.
- ii) It did not adequately cover the management and human resources theories.
- iii) It was technical totally outdated.

#### **4.2.2.2 Suggestions proposed by the respondents**

Most respondents were convinced that existing management practices were very limited and did not enable employees to efficiently execute their management work. They felt that existing management theories and practices should be, as a matter of urgency, critically scrutinised, evaluated and improved in order to comply with the requirements of efficient management.

The following proposals were made by the respondents:

- a) Update the present Mine Manager's Certificate of Competency.
- b) Acquire more up to date relevant management programs.
- c) Introduce more leadership and human resources theory.
- d) Introduce a planning process and management method that could be utilised by all employees on all the levels of the organisation.
- e) Introduce management development programs for all employees on all the levels of the organisation.
- f) Develop and maintain the managerial competencies of all the employees on all the levels of the organisation.
- g) Allow each employee to manage his own work.
- h) Introduce a standard based assessment process.

#### **4.2.3 Conclusions arrived at by the researcher during the discussions**

The researcher arrived at the following conclusions:

- 4.2.3.1 The administrative management approach appeared to be the management approach predominantly being utilised by the mining industry.
- 4.2.3.2 Short duration management programs were extensively used by the mining industry.
- 4.2.3.3 A comprehensive, practical and integrated management method did not exist in the South African mining industry.
- 4.2.3.4 Planning was not performed on a comprehensive company wide basis according to a specific planning process with all employees fully involved.
- 4.2.3.5 Comprehensive efficient planning procedures involving all the employees from the executive level to the worker level on the mines did not exist.

- 4.2.3.6 Employees were normally told what their results and objectives should be.
- 4.2.3.7 Organisational structures could not be developed scientifically with the existing management practices.
- 4.2.3.8 Delegation of responsibilities and authority were normally inefficiently performed.
- 4.2.3.9 Employees were not adequately involved in setting their own objectives, performance standards and the results required from them.
- 4.2.3.10 Work flows were seldom performed and alternative methods to achieve planned results were rarely determined and developed and the best alternative was basically never selected and implemented especially at the lower levels.
- 4.2.3.11 Performance standards as well as risk assessments were set and performed mainly by staff departments who in many cases lack the relevant practical work experience.
- 4.2.3.12 Leading was totally inadequate and was raised as a problem area by all respondents.
- 4.2.3.13 Top management mainly set policies, procedures and regulations mostly without the necessary involvement of all the people affected by it.
- 4.2.3.14 Action plans could not be adequately integrated and coordinated.
- 4.2.3.15 Job specifications could not be determined scientifically with existing management practices.
- 4.2.3.16 Employees were mainly recruited, selected, appointed and trained by staff departments with no or limited involvement of the relevant supervisors.
- 4.2.3.17 Employees, especially on the lower levels, were not allowed to recruit, select and appoint the employees they require.
- 4.2.3.18 Training and development programs were mostly carry-overs from the past and in many instances were not mine specific but general group deduced programs.
- 4.2.3.19 Communication, reporting and control were in most cases totally inadequate.
- 4.2.3.20 Existing management systems did not lend themselves to complete computerisation.

### **4.3 PREPARATION AND EVALUATION OF THE DATA**

The data from the responses was arranged into a systematic and logical format in order to facilitate the analysis and evaluation of it. The purpose with the preparation of the data was to study the effect of variations or relations between specific factors and categories of the responses to the questions in the questionnaires. The results of each category of the 28 questions (refer appendices 7 and 8) of the bulk and the random selected samples were firstly statistically processed by the Department of Statistics of the University of Pretoria. The purpose was to evaluate the validity of the averages or arithmetic means of the assessment of each question (Bowker & Lieberman, 1959:7). The Department confirmed that all the responses to the questions qualified within the normal acceptable limits and could be utilised for further evaluation purposes.

#### **4.3.1 Responses to the questionnaires**

A total of 36 mining groups, representing 73 mines, mining 12 different minerals, participated in the completion of the questionnaires. In total 43 managerial positions, classified into four main

management levels, participated in the research (refer table 4.1). Of these responses there were a total of 62 (37.80 per cent) responses where no comments or suggestions were made or proposed. The 62 responses consisted of 26 and 36 responses from the Mine Managers' Certificate of Competency and the General Management questionnaires respectively. Of the 110 Mine Managers' Certificate of Competency responses 26 (23.64 per cent) made no comments or suggestions. Of the 54 General Management responses 36 (66.67 per cent) made no comments or suggestions respectively (refer table 4.1). Of the total of 164 respondents, 102 (62.20 per cent) expressed their concern with the adequacy of the existing management practices in the mining industry.

Of the random selected sample of 42 respondents, 16 (38.09 per cent) initially made no comments or suggestions. After the discussions all 42 (100 per cent) expressed their concern with the present management practices in the mining industry and proposed suggestions to improve it. It in effect implied that 144 (87.8 per cent) of the respondents eventually expressed their concern with the inadequacy of existing management practices.

Item	Number
Questionnaires sent	245
Questionnaires returned	164
Mining groups participating	36
Total mines participating	73
Main minerals covered	12
Managerial positions participating	43
Management levels participating	4

**Table 4.1: Results of the sampling**

One factor that became apparent from the responses was that a comprehensive, practical and integrated management method in the South African mining industry did not exist. The theoretical managerial knowledge of the respondents was low. As a consequence some of the respondents might not have understood and interpret all the questions correctly. In general it was felt that the data obtained with this research was the best that the researcher could hope to obtain under the circumstances. It can be regarded as a reliable reflection of the status of existing management practices in the South African mining industry.

Responses	Made no comments or suggestions	Made comments or suggestions	Total
Mine Managers' Certificate of Competency	26	84	110
General Management	36	18	54
Total	62	102	164

**Table 4.2: Analysis of the responses**



#### 4.3.2 Management approaches in use in the South African mining industry

From the total of 164 responses, 158 (96.34 per cent) supported the process or administrative management approach (refer section 4.2.3.1). It would appear that this management approach was currently the predominant management approach being utilised in the mining industry. Other short-term management programs and interventions were to some extent popular on the mines and were implemented on a continuous basis but were usually of a short-lived nature and value (refer section 4.2.2.1. (a) (i)). It could be concluded that the process management approach, originally developed by Henri Fayol, remained the most popular and utilised management approach in the South African mining industry to date.

#### 4.3.3 Area covered by the research

Responses were received mostly from mining groups and mines representing the eight main mineral mining sectors (refer section 3.6 and tables 1.1 and 4.3). The responses covered the geographical areas of the Western Cape Province, Northern Cape Province, Free State Province, North Western Province, Limpopo Province, Gauteng Province, Mpumalanga Province and the Kwa-Zulu Natal Province of the Republic of South Africa.

#### 4.3.4 Main minerals covered by the research

Twelve different types of minerals were covered. They were grouped into the eight main mineral groups and 'other' (refer figure 4.2 and table 4.3). Most of the larger mining groups normally have interests in more than one mineral sector. For training purposes and to fill vacancies their managers were frequently transferred, between the mines in the different mineral sectors where and when required. The sample could therefore be regarded as representative of the total South African mining industry.

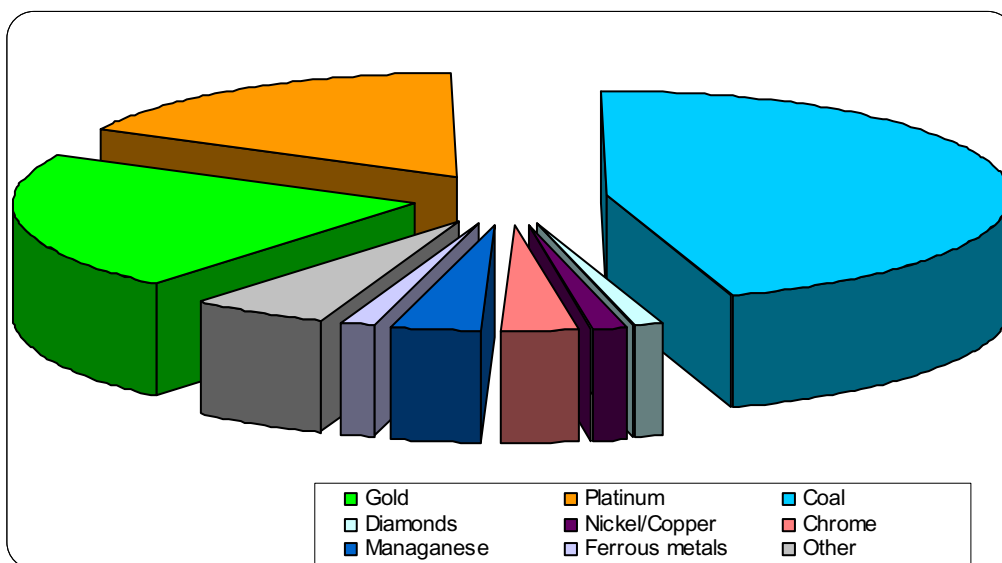


Figure 4.2: The mineral sectors covered by the research

The greater contribution by the coal mining sector had no specific implications except that it most probably could be construed as an indication of the greater interest and preparedness of the managers in this sector to participate in the research. This sector appeared to be more concerned with the application of management principles. Low percentage returns such as those from the diamond, ferrous, chrome and nickel/copper mineral sectors should be awarded the same value, as that of the higher percentage returns such as the coal, gold and platinum mineral sectors. Most of the larger mining groups control several mineral sectors and the managers of these groups, are as part of their scheduled development programs, regularly transferred between the different mineral sectors in which the specific group holds mining interests.

Mineral sector	Returns	Percentage
Gold	35	21.34
Platinum	27	16.46
Coal	73	44.51
Diamonds	2	1.22
Nickel/Copper	5	3.05
Chrome	5	3.05
Manganese	6	3.66
Ferrous metals	2	1.22
Other	9	5.49
Total	164	100.00

**Table 4.3: Mineral sectors covered by the research**

#### 4.3.5 Evaluation of the sampling results

For evaluation purposes the sampling was designed in five phases as outlined below:

- The bulk self rated sample.
- The random selected self rated sample.
- The random selected rated sample.
- The managerial deficiencies (refer section 3.8.7.1, table 3.3 and question 29), and
- The suggestions to improve existing management practices (refer section 3.8.7.1).

In the bulk self rated sample all the respondents rated their own management competencies measured against the perceived requirements of the comprehensive, practical and integrated management theory and method. The objective with the research questions was to established an accurate as practical possible judgment of the compency of managers in the mining industry.

As a result of the low management competency deduced from the responses the researcher deemed it necessary to conduct a further study on a random selected group from the rspndents. The random group was scientifically selected by an independent accredited institution. The sample constituted of a proportionally representation of the main management categories in the mining industry

Questions	Bulk sample	Random sample	
	Self rated	Self rated	Rated
	Ave mean	Ave mean	Ave mean
1	2.40	2.62	1.29
2	2.41	2.67	1.26
3	2.43	2.52	1.21
4	2.54	2.52	1.21
5	2.23	2.43	0.50
6	2.35	2.45	0.57
7	2.24	2.38	0.73
8	2.25	2.38	1.05
9	2.39	2.48	1.29
10	1.80	1.71	0.21
11	2.36	2.50	1.29
12	1.51	1.76	0.57
13	2.03	2.86	1.67
14	2.07	2.67	1.07
15	2.24	2.45	1.29
16	1.86	1.71	0.26
17	2.33	2.36	1.14
18	2.21	2.23	1.38
19	2.07	2.36	1.36
20	2.14	2.40	1.19
21	2.14	2.62	1.45
22	2.36	2.38	1.48
23	1.91	2.07	1.21
24	1.88	2.10	1.19
25	2.10	2.19	1.00
26	2.40	2.65	1.81
27	2.43	2.74	1.90
28	2.50	2.63	1.98
Total	61.58	66.94	32.56
Ave	2.20	2.39	1.16
Std Dev	0.24	0.29	0.44

**Table 4.4: Results of the first three phases of the sampling**

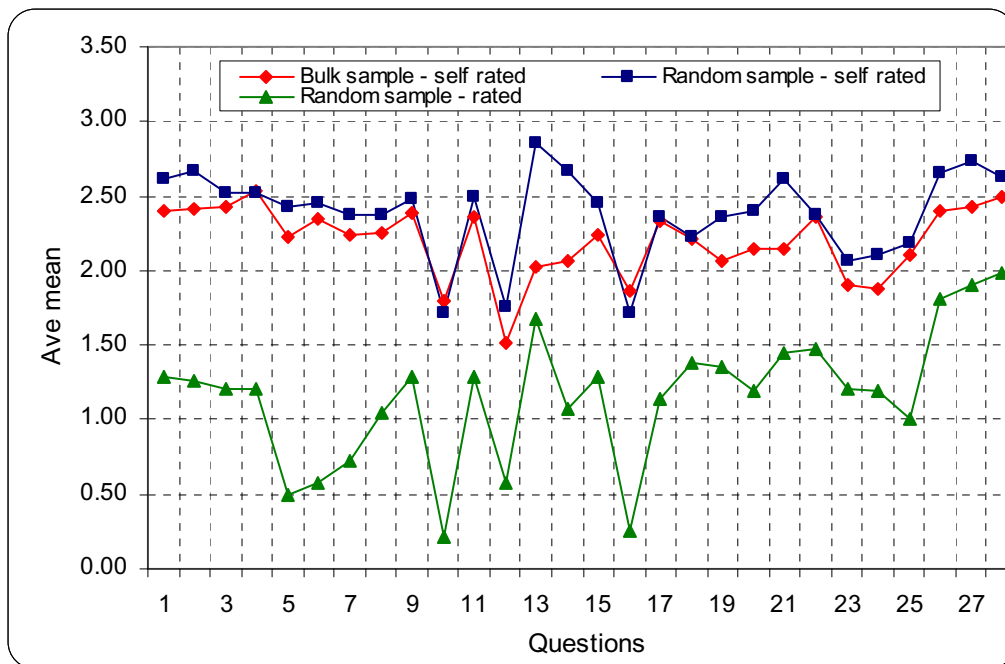
#### 4.3.5.1 Results of the first three phases of the sampling

The results of the first three samples are depicted in table 4.4. Only the average mean of each question and of each sample is reflected for further evaluation and analysis of the:

- a) results of the sampling, and
- b) efficiency of management practices and determination of the management competencies.

It would appear that significant variations in the assessments between the questions within each sample and between the three sample results exist (refer table 4.4 and figure 4.3). This trend is evident right through the industry in the different management categories. It, at this early stage, would appear that the management development programmes introduced by the industry are totally inadequate to enable managers to efficiently manage for the results required from each of them.

There may be many reasons for the incompetency of managers in the mining industry. The reasons for the variations and the low assessments would be analysed, established and discussed in the following sections.



**Figure 4.3: Graphical presentation of the three samples**

#### 4.3.5.2 The bulk self rated sample

The bulk sample represented the total sample and was the first and initial step in inviting responses from potential members of the three mining associations. It constituted the basis from which:

- a) a general assessment of the state of the prevailing management practices in the South African mining industry and the opinion or views and possible suggestions from the respondents for improvement of these practices could be established, and
- b) a random sample could be selected in order to further establish or confirm the validity of the general responses.

#### 4.3.5.3 The random selected self rated sample

From the responses of the bulk sample it would appear that there were significant and unrealistic variations within each questionnaire. It was therefore deemed necessary to select a representative sample at random from the responses received (refer section 3.7.2).

The purpose with this was to determine whether there were significant inconsistencies and if so what the magnitude and implications of it were. It would further be utilised to determine and evaluate the differences and magnitude of these differences between the self rated and rated assessments.

#### 4.3.5.4 The random selected rated sample

Through personal discussions with the respondents of the random selected rated sample the researcher attempted to establish whether respondents in general were inconsistent with the

assessment of the questions in the questionnaires. It was also expected that respondents were in general inclined to rate their knowledge and application of management work higher than what it actually was (refer section 3.7.2).

This sample would serve to establish a more realistic assessment which could be used to determine the most realistic managerial competency gap in the South African mining industry. The managerial competency of the different levels of management in general in the South African mining industry is expected to be unacceptably low.

#### 4.3.5.5 Grouping of the data of the three samples

Class interval	Frequency ( <i>f</i> )			Cumulative Frequency			Fraction Cumulative Frequency		
	<i>F</i> <sub>1</sub>	<i>F</i> <sub>2</sub>	<i>F</i> <sub>3</sub>	<i>CF</i> <sub>1</sub>	<i>CF</i> <sub>2</sub>	<i>CF</i> <sub>3</sub>	<i>FCF</i> <sub>1</sub>	<i>FCF</i> <sub>2</sub>	<i>FCF</i> <sub>3</sub>
0.21 – 0.30			2			2			0.071
0.31 – 0.40			0			2			0.071
0.41 – 0.50			1			3			0.107
0.51 – 0.60			2			5			0.176
0.61 – 0.70			0			5			0.176
0.71 – 0.80			1			6			0.214
0.81 – 0.90			0			6			0.214
0.91 – 1.00			1			7			0.250
1.01 – 1.10			2			9			0.321
1.11 – 1.20			3			12			0.429
1.21 – 1.30			8			20			0.714
1.31 – 1.40			2			22			0.786
1.41 – 1.50			2			24			0.857
1.51 – 1.60	1		0	1		24	0,036		0.857
1.61 – 1.70	0		1	1		25	0.036		0.893
1.71 – 1.80	1	3	0	2	3	25	0.071	0.107	0.893
1.81 – 1.90	2	0	2	4	3	27	0.143	0.107	0.964
1.91 – 2.00	1	0	1	5	3	28	0.179	0.107	1.000
2.01 – 2.10	4	2		9	5		0.321	0.179	
2.11 – 2.20	2	1		11	6		0.393	0.214	
2.21 – 2.30	6	0		17	6		0.607	0.214	
2.31 – 2.40	7	7		24	13		0.857	0.464	
2.41 – 2.50	3	5		27	18		0.964	0.643	
2.51 – 2.60	1	2		28	20		1.000	0.714	
2.61 – 2.70		6			26			0.929	
2.71 – 2.80		1			27			0.964	
2.81 – 2.90		1			28			1.000	

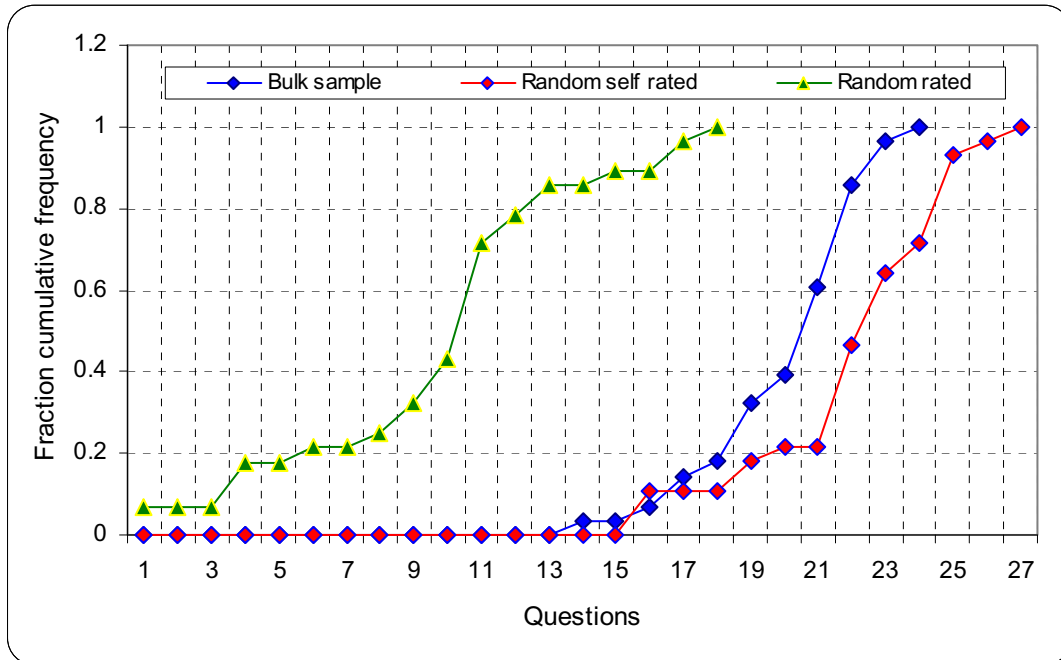
**Table 4.5: Cumulative frequency table**

Variations between the average means of the self rated bulk sample, self rated random sample and the rated random sample are reflected in table 4.4. The data of each is arranged into a cumulative frequency table displaying the class intervals, frequencies (*F*<sub>1</sub>, *F*<sub>2</sub>, *F*<sub>3</sub>), cumulative frequencies (*CF*<sub>1</sub>, *CF*<sub>2</sub>, *CF*<sub>3</sub>) and fraction cumulative frequencies (*FCF*<sub>1</sub>, *FCF*<sub>2</sub>, *FCF*<sub>3</sub>) as reflected in table 4.5. The grouping of the data would facilitate easier deductions, evaluations and comparisons.

From table 4.5 it was concluded that the assessments of all 28 questions fall below the following class intervals:

- the bulk self rated sample below 2.60 (65 per cent),
- the random selected self rated sample below 2.90 (72.5 per cent), and
- the random selected rated sample below 2.00 (50 per cent).

The above implies that the assessments of the bulk self rated and random selected self rated samples were much higher than that of the random selected rated sample. This could be attributed to the fact that the respondents in general were inclined to assess their managerial competencies significantly higher than the assessed values.



**Figure 4.4: Cumulative frequency functions**

From the assessments of the three samples it appeared that there were large variations between the assessments of the different questions. Most significant are the assessments of questions 5, 6, 7, 8, 10, 12, 14, 16 and 25 which involved the following tasks:

- a) Develop the work flow for each alternative method.
- b) Determine the task and resources for each alternative.
- c) Schedule the work flow for each alternative method.
- d) Compile the budget for each alternative method.
- e) Determine and assess all risks.
- f) Computerise the total plan.
- g) Develop the necessary posts.
- h) Develop the optimal organisational structure.
- i) Develop the necessary performance standards for each task.

The differences were significant. The possible reasons for the differences would be discussed further after the evaluations of the management functions and the management discipline. It, however, confirmed the statement earlier in chapter 3 and proved to some extent in chapter 4 that respondents in general were inclined to overrate their management competencies (refer section 3.7.2). The reason for this difference could be that existing management practices were simply inadequate.

#### 4.3.6 Evaluation of the management functions

For the purpose of evaluating the management functions, the results of the random selected sample were used. The self rated and rated mean values were directly analysed, evaluated and compared

Management function	Questions	Random selected sample				Proposed standard
		Mean per question				
		Self rated	Average	Rated	Average	
Planning	1	2.62		1.29		
	2	2.67		1.26		
	3	2.52		1.21		
	4	2.52		1.21		
	5	2.43		0.50		
	6	2.45		0.57		
	7	2.38		0.73		
	8	2.38		1.05		
	9	2.48		1.29		
	10	1.71		0.21		
	11	2.50		1.29		
	12	1.76		0.57		
Total		28.42	2.37	11.18	0.93	3.4
Organising	13	2.86		1.67		
	14	2.67		1.07		
	15	2.45		1.29		
	16	1.71		0.26		
	17	2.36		1.14		
	18	2.23		1.38		
	19	2.36		1.36		
	20	2.40		1.19		
	21	2.62		1.45		
	22	2.38		1.48		
Total		24.04	2.40	12.29	1.23	3.4
Controlling	25	2.19		1.00		
	26	2.65		1.81		
	27	2.74		1.90		
	28	2.63		1.98		
Total		10.21	2.55	6.69	1.67	3.4

**Table 4.6: Analysis of the random selected sample**

From table 4.6 it appeared that the:

- self rated assessment values were significantly lower than the proposed standard mean of 3.4 (85 per cent),
- all assessment values, self rated and rated, were unacceptably low,
- assessment of the planning function in particular was extremely low, and
- low assessment of the planning function should be regarded as the main reason for the unacceptable low managerial competency of the mining industry.

##### 4.3.6.1 Evaluation of the planning function

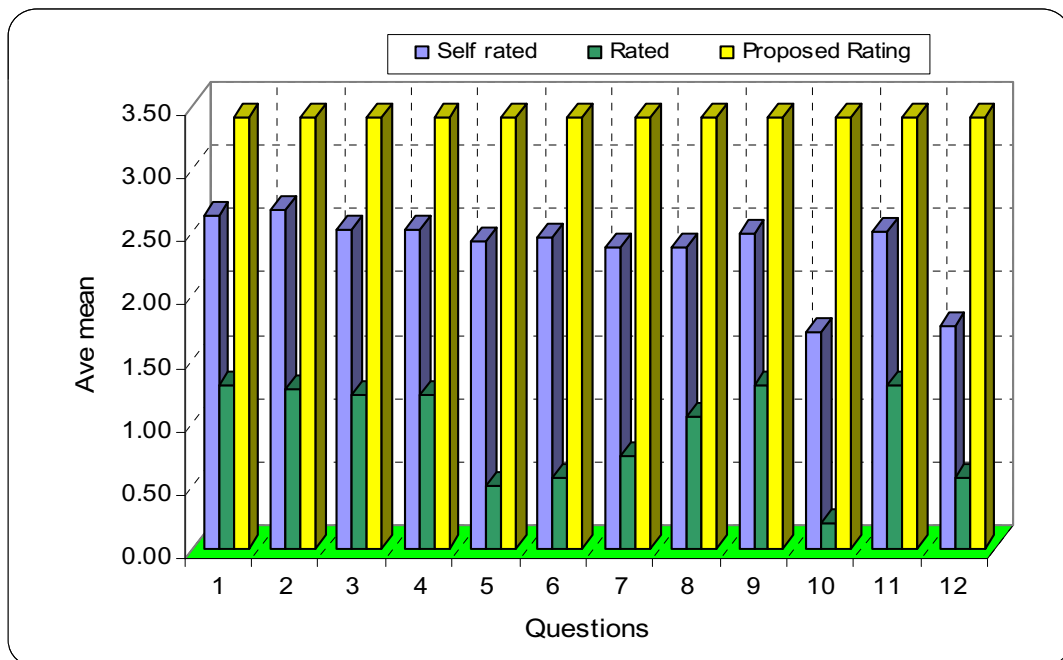
Most management theorists and practitioners agreed that planning should occur at all the levels of the organisation. It should form the basis of a sound management approach and of the four

management functions. Planning was regarded as the most fundamental management function and that all management work stemmed from it (Donnelly et al,1995:156). Donnelly et al (1998:139) stated that planning is essential if organisations are to achieve effective levels of performance and if they wish to become and remain competitive in the local and global markets (refer section 2.6.2.1).

The planning work goes mainly through two identifiable phases: the operational phase and the planning phase respectively. During these phases the emphasis and time spent on the management functions would vary depending on the circumstances and the management work required at that specific stage. For example less time would be spent on planning work during the operational period whilst during the annual planning period more time would be spent on planning work. It is important that, in view of the importance of planning to the success of an organisation, this management function be awarded the correct attention. The plan should be the blue print for optimal performance for the ensuing period. It would provide the direction and control measures for the employees and the organisation as a unit to achieve the required results.

**a) The operational phase**

The average mean of 0.93 (23.25 per cent) of the rated random sample for the planning tasks implied, according to the assessment scale, that planning was seldom performed correctly (refer table 4.6). When comparing the assessments of the self rated and rated random samples it would appear that the assessments of questions 5, 6, 7, 8, 10 and 12 were exceptionally low (refer section 4.3.5.5, figure 4.5 and table 4.6).



**Figure 4.5: Evaluation of the planning function**

The extremely low assessments of these questions were proof that in the South African mining industry, in general, certain management planning work is not or was seldom performed by the



managers. Planning is the fundamental management function where the 'plan' for the company's future action is designed. It should establish the results required, the objectives and the best method with which to realise these objectives (refer section 2.6.2.1).

From the comments on the deficiencies and proposed suggestions by the respondents to improve the existing management practices and the observations by the researcher it would appear that the low assessment of the planning function could mainly be attributed to the following reasons (refer sections 4.2.2.1 (b) and 4.2.3.2):

- i) Comprehensive and logical planning processes did not exist or alternatively were inadequately developed and implemented.
- ii) Planning procedures were seldom used.
- iii) The most probable results were seldom forecasted.
- iv) The most probable achievable results were seldom stated.
- v) The realisable objectives were seldom formulated.
- vi) Alternative methods were seldom developed.
- vii) The best methods were seldom selected.
- viii) Risks were not determined and assessed by the specific responsible employees.
- ix) Risk assessments and the compilation of procedures were mainly compiled by senior and top management assisted by trained specialist staff members.
- x) Policies and procedures were not compiled as a logical step in the planning process.
- xi) Not all employees were involved in the planning of the results required from them and the objectives they should endeavour to realise.
- xii) Tasks and resources were very seldom determined for alternative methods.
- xiii) The work flow and time and motion studies were seldom scheduled and compiled.
- ix) Budgets were in many instances escalated versions of the previous year's budget.
- x) Plans were not comprehensively computerised throughout the organisation.

From the above it would appear that available management practices did not equip the mine management with the required theoretical management knowledge and as a result the planning function in general was inadequately performed. It can not form a sound basis for the other management functions.

#### **b) The planning phase**

From the empirical research findings it would appear that the mining industry in general do not follow specific planning structures (refer section 4.2.2.1 (b)). The following plans were normally compiled:

- Strategic plans.
- Long-term plans and or operational plans.
- Budgets.

It was assumed that the times spent by management on the management functions would vary during the planning and operational periods in the organisation (refer appendix 9). During the

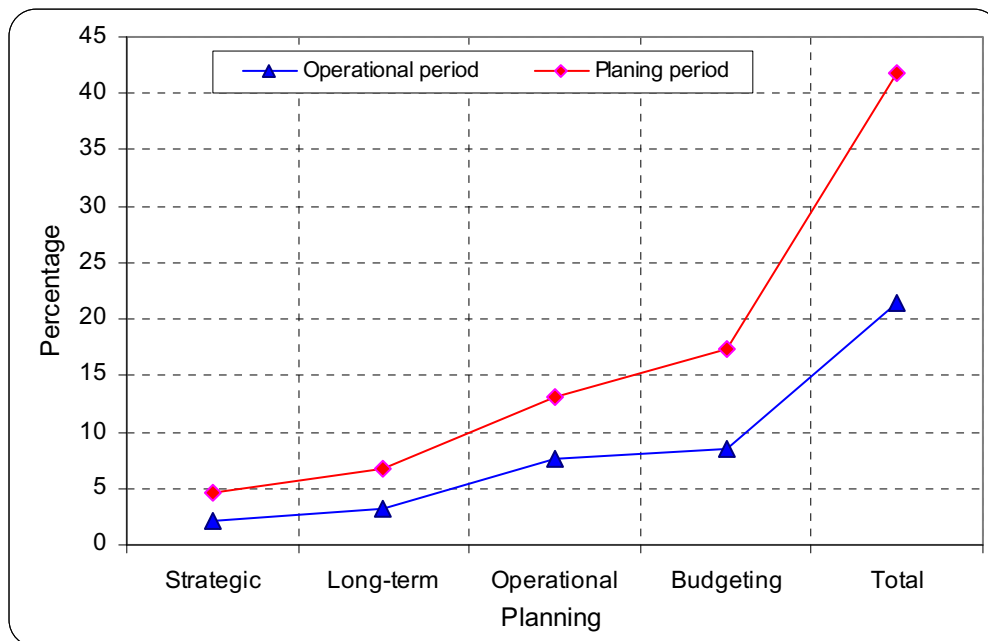
interviews with the random selected group of respondents the assessments of 23 (54.7 per cent) of these respondents were obtained on the percentage time spent on the:

- different components of the planning function during the planning period, and
- management work during the operational and planning periods.

Planning components	Percentage time spent during	
	Operational period	Planning period
Strategic planning	2.17	4.56
Long-term planning	3.26	6.74
Operational planning	7.61	13.04
Budgeting	8.48	17.39
Total	21.52	41.73

**Table 4.7: Time spent on the planning components during the operational and planning periods**

The planning period on the mines normally lasts for approximately three months. From table 4.7 and figure 4.6 it appeared that during the planning period approximately 41.73 per cent of the total management time was devoted to planning work. This was mainly due to the urgency associated with the finalisation of the plan and the time required to do it. During the operational period the average time spent on planning was approximately 21.52 per cent. Planning at the lower levels basically consisted of one-sheet budgets directly derived from the supervisor’s budget.



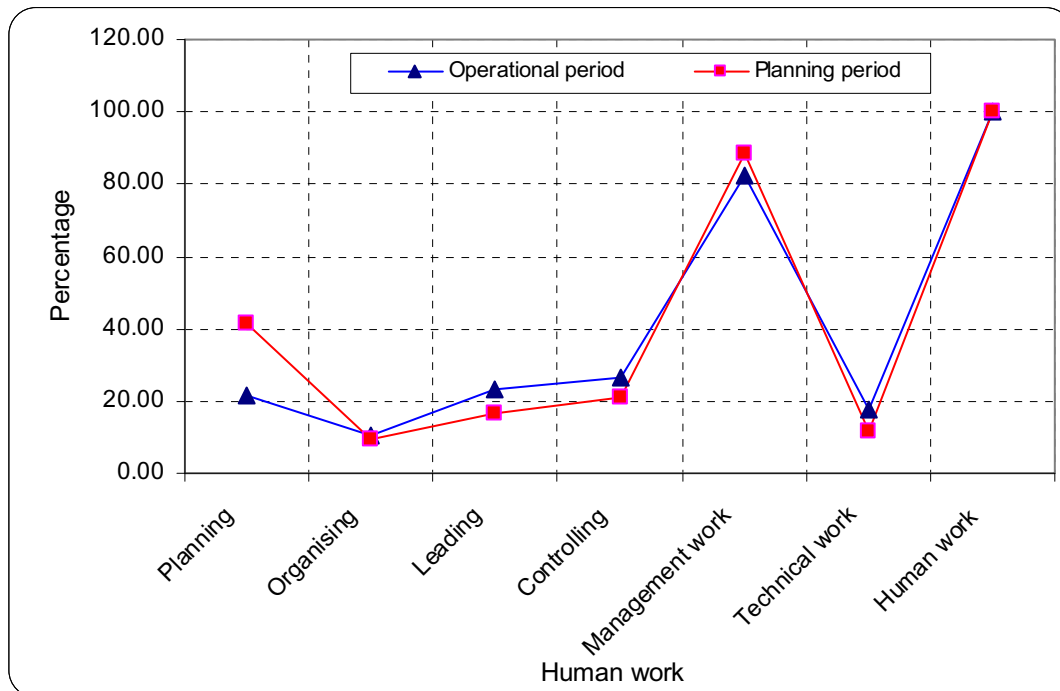
**Figure 4.6: Time spent on the planning function during the planning period**

No standard criteria with regard to the percentage of management time that should be spent on the planning components could be ascertained from the literature. In table 4.8 human work is the sum of management work and technical work. The time spent per planning category depends on the:

- type of business and level in the organisation,
- size of the organisation,
- geographical distribution,
- term of contracts, and
- the planning components required for that specific environment.

Management function	Percentage time spent during	
	Operational period	Planning period
Planning	21.52	41.73
Organising	10.65	9.35
Leading	23.48	16.52
Controlling	26.74	21.09
Total management work	82.39	88.69
Technical work	17.61	11.31
Total human work	100.00	100.00

**Table 4.8: Time spent per management function during the operational and planning periods**



**Figure 4.7: Time spent per management function during operational and planning periods**

The average time spent on the different management functions during the operational period is depicted in table 4.8 and figure 4.7. During the planning period the time spent on the other management functions decreased in order to allow for more time to be spent on the planning function.

#### 4.3.6.2 Evaluation of the organising function

From table 4.6 it would appear that the rated means of the questions on the organising function were extremely low. The average mean of the ten questions (questions 13 to 22) was 1.23 (30.75 per cent) which implied that according to the assessment scale the organising function was seldom or never performed correctly (refer section 4.2.2.1 (c) and 4.2.3.5).

Of particular concern was the low assessments of the activities of developing the necessary posts (26.75 per cent), developing of the optimal organisational structure (6.50 per cent), determination of the lines of authority (28.50 per cent) and the affecting of adequate coordination (29.75 per cent). The average assessment of 6.50 per cent of the developing of the optimal organisational structure could be attributed to the fact that existing management theories did not provide management with the means to develop an organisational structure. In practice organisational structures can not be developed scientifically because existing theories do not provide adequate means (Davis & Weckler, 1996:19) and (Drucker, 1968:352). Despite this deficiency of the administrative management approach management theorists and practitioners still maintain that management consists of the functions of planning, organising, leading and controlling.

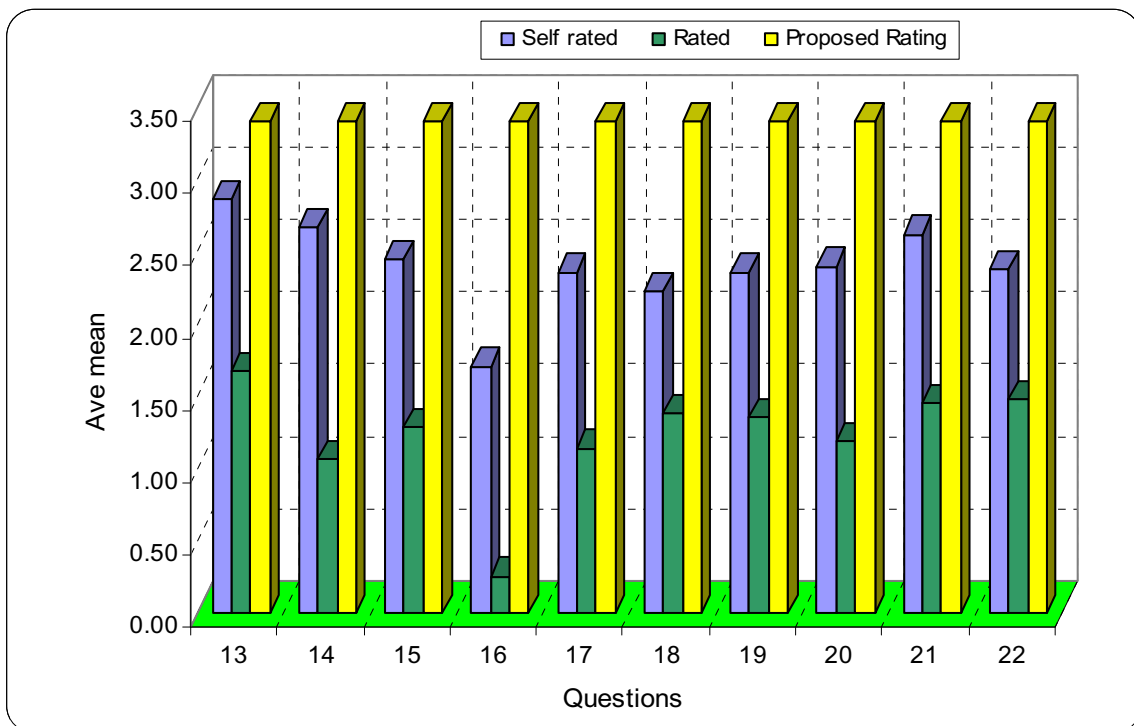


Figure 4.8: Evaluation of the organising function

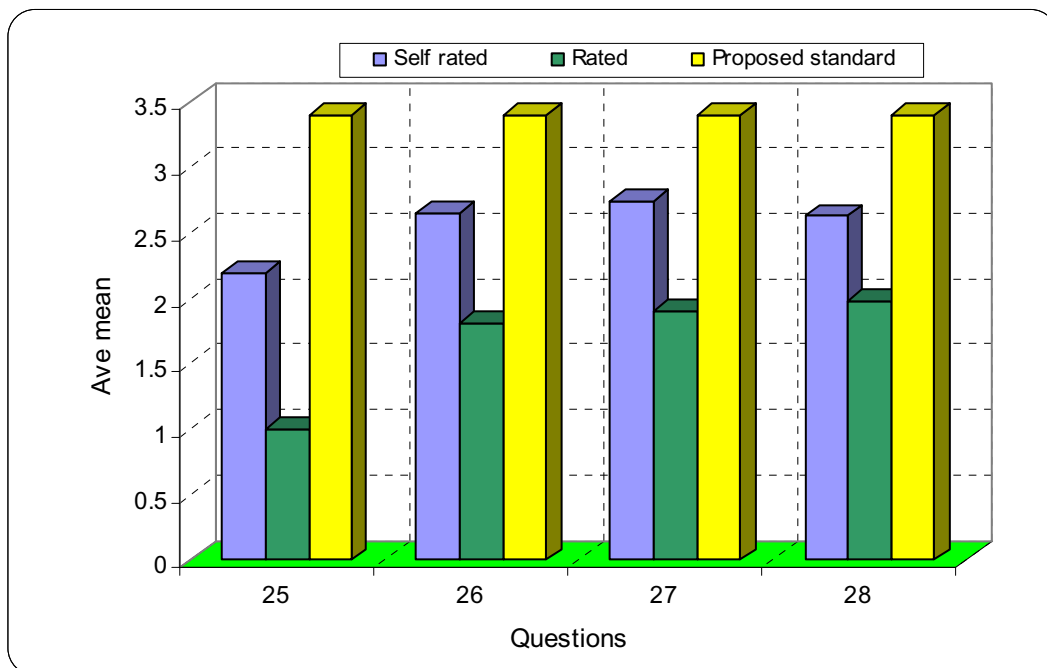
The low assessments proved that in practice the following management work was inadequately performed:

- a) Development of job specifications and posts.
- b) Delegation of accountability.
- c) Determination of the optimal organisational structure and authority lines.
- d) Establishment of communication lines.
- e) Establishment of relationships among posts.
- f) Establishment of effective coordination.
- g) Establishment of supervisory schedules on all levels, and
- h) Determination of supervisory accountabilities.

The comments and observations from the respondents and researcher supported the views above (refer section 4.2.2.1 (c) and 4.2.3.5). This deficiency was most probably responsible for the many haphazardly labour reductions that could do more harm than good to the operating performance of the organisation.

#### 4.3.6.3 Evaluation of the controlling function

The average self rated assessment of the controlling function is 2.55 (63.75 per cent) and the average rated assessment is 1.67 (41.75 per cent) – on average 22.00 per cent lower than that of the self rated assessment (refer table 4.6). The management activity of developing the necessary performance standards was extremely low at 1.00 (25.00 per cent). This proved the point that performance standards were in general not set on each management level by each employee for each task and resource (refer section 4.2.2.1 (e i)).



**Figure 4.9: Evaluation of the controlling function**

With reference to sections 4.2.2.1 (e), 4.2.3.7 and 4.2.3.9 during the analysis and evaluation of the deficiencies identified by the respondents and observed by the researcher it was established that:

- The performance levels and standards were set mostly by specialised staff departments and very seldom by the individual workers.
- The standards sometimes set by the workers were mostly not based on scientific analysis and measurement.
- Corrective measures were taken most of the time.
- Performance standards were not established during the planning process by each employee.
- Measurement and reporting of performance was in many situations statutory compulsory by means of the shifbosses' logbook.

#### 4.3.7 Evaluation of the management discipline

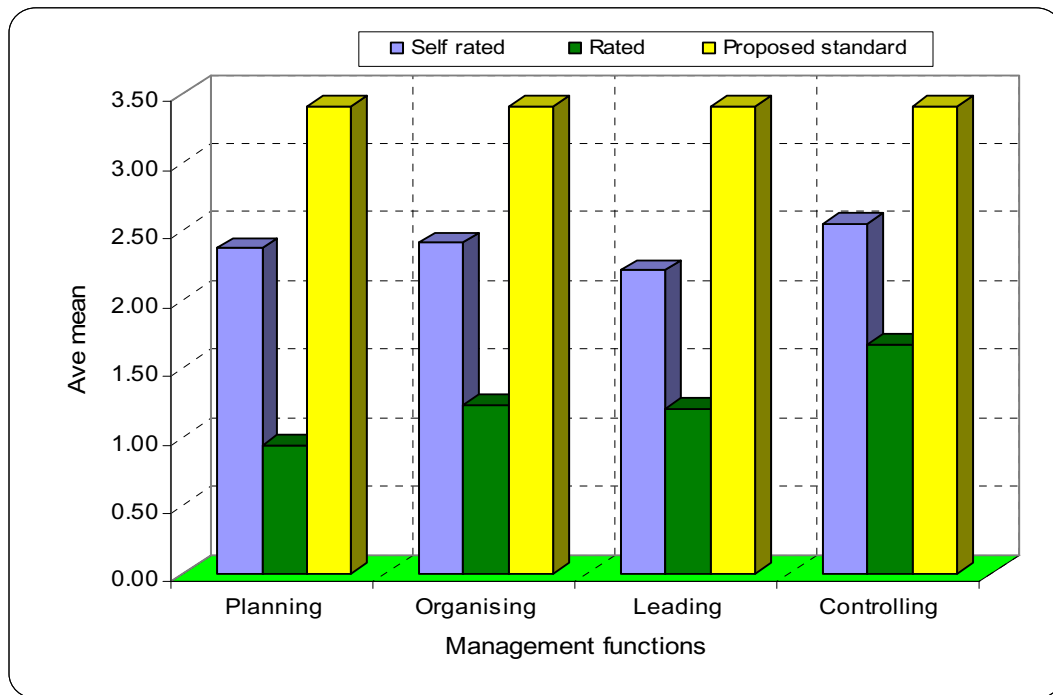
The assessment of the four management functions of the random selected rated sample reflected an average mean of 1.26 (31.50 per cent) - a difference of the mean of 1.10 (27.5 per cent) compared to the average mean of 2.36 (59.00 per cent) of the random selected self rated sample. This huge difference could be attributed mainly to the tendency of the respondents to assess their managerial knowledge and competency much higher than what it actually was (refer table 4.9).

Management functions	Random selected self rated sample		Random selected rated sample		Proposed standard	
	Ave mean	Percentage	Ave mean	Percentage	Ave mean	Percentage
Planning	2.37	59.25	0.93	23.25	3.4	85.00
Organising	2.41	60.25	1.23	30.75	3.4	85.00
Leading	2.09	52.25	1.20	30.00	3.4	85.00
Controlling	2.55	63.75	1.67	41.75	3.4	85.00
Average	2.36	59.00	1.26	31.50	3.4	85.00

**Table 4.9: Evaluation of the management discipline**

On a rated basis the average mean of 0.93 (23.25 per cent) of the planning function was the lowest of the average means of the four management functions. Although the other three functions were rated slightly higher (organising 1.23, leading 1.20 and controlling 1.67) the average assessment of 1.26 was totally unacceptable for efficient management performance by any organisation.

When compared to the proposed standard of 3.4 a deviation of 2.14 (53.5 per cent) was reflected (refer table 4.9). The reasons for the huge deviation were identified during the evaluation of the planning, organising and controlling functions (refer section 4.3.6.1, 4.3.6.2 and 4.3.6.3).



**Figure 4.10: Evaluation of the management discipline**

### 4.3.8 Evaluation of the management levels

#### 4.3.8.1 Classification of the management positions

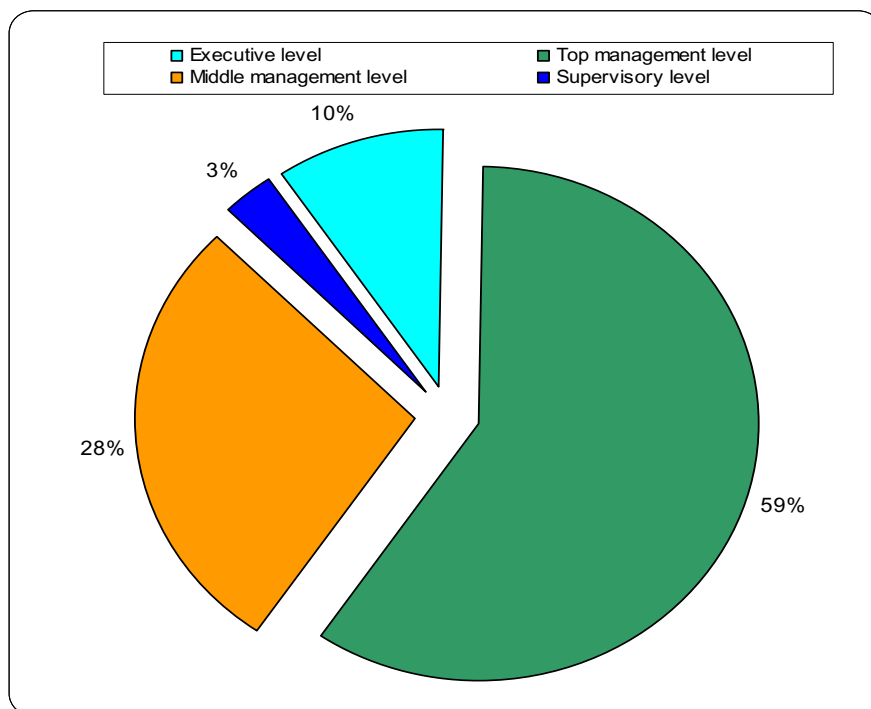
In order to determine whether there could be differences in the managerial competencies of the different management levels the respondents were classified into the four main levels of management in the mining industry and analysed separately. The 43 managerial positions that participated in the research, as mentioned in section 4.3.1 and table 4.1 were classified and grouped into the following four managerial levels and defined as follows:

- a) The executive level is the top level of the mining house or head office and consists normally of the chief executive officer or managing director and the departmental heads reporting directly to him in line positions. It constitutes the main decisionmaking body of the mining house or group.
- b) The top management level is the top level in charge of the mine and normally consists of the general manager or mine manager and the departmental heads reporting directly to him. This team needs to implement company decisions and policies and is solely accountable for the delivering of the required results to the customers and stakeholders.
- c) The middle management level consists of the departmental heads on a mine and the in-line subordinates reporting directly to them. The middle management teams on the mines represent the different departments and is each accountable for specific results which would jointly add up to the total results of the mine.
- d) The supervisory management level consists of the supervisors reporting to middle management and supervising the performance of the front-line workers. These levels are primarily accountable for the efficient running of the operations of the sections of each department in order to render the most desirable results safely and efficiently.

#### 4.3.8.2 Evaluation of the management levels

Due to the absence of a comprehensive, practical and integrated management theory it was perceived that not only could there be an overassessment of managerial competencies by the respondents but also significant differences in managerial competencies between the different management levels. For these reasons it was decided to conduct personal interviews with a random selected group from the main group of respondents and to classify the main group of respondents into management levels (refer section 4.3.8.1).

Of the total of 164 respondents, 16 (9.75 per cent), 97 (59.15 per cent), 46 (28.05 per cent) and 5 (3.05 per cent) were executive, top, middle management and supervisory management members respectively. The head office management and supervisory management members are relatively few compared to the top and middle management levels that constitute by far the majority of the certificated members (refer figure 4.11). The supervisory management levels are directly responsible for the achievement of the ground floor results of the organisation. In total the top and middle management levels constitute 87.2 per cent of the sample.



**Figure 4.11: The relative ratios of the management levels**

It is a relative true reflection of the reality in the mining industry. It is also true that most certificated members normally progress through the ranks and only qualify to enroll for the Mine Manager's Certificate of Competency examination when they are within the supervisory and middle management levels. Most managers would eventually be accommodated in the middle and top management levels. Only a few would eventually reach the executive level position.

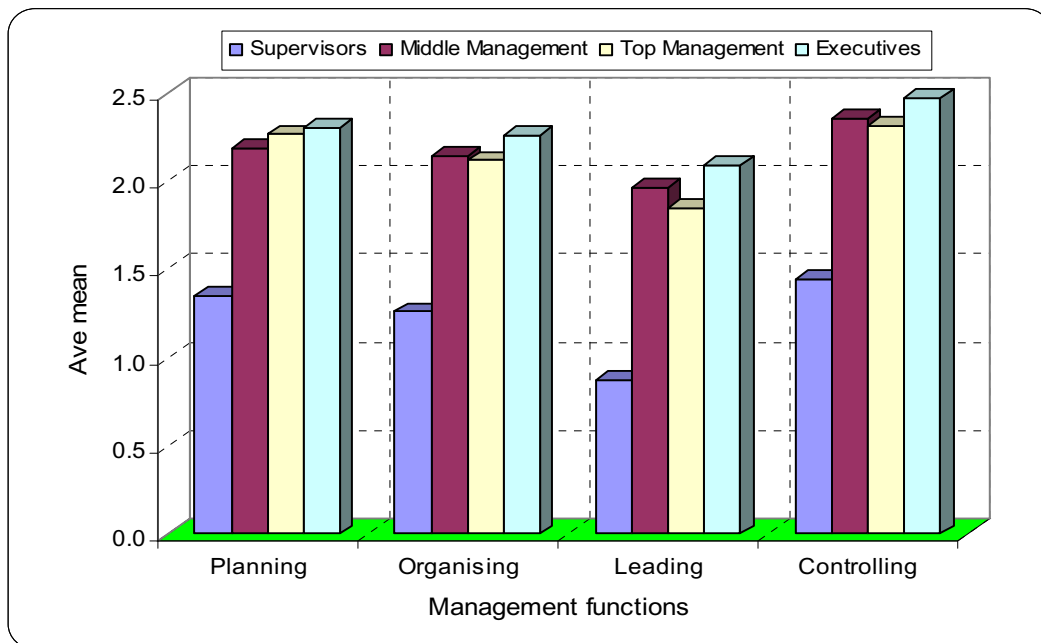


From the four management levels the supervisory management level was assessed as the lowest with an average mean of 1.3 (32.5 per cent). This could be attributed to the fact that the supervisory levels in general received less theoretical management training and was less experienced in management work. The average mean assessment of the four management levels was 1.98 or 49.5 per cent (refer table 4.10 and figure 4.12).

Management level	Management function				Average
	Planning	Organising	Leading	Controlling	
	Ave	Ave	Ave	Ave	
Executive	2.3	2.3	2.1	2.5	2.3
Top management	2.3	2.1	1.8	2.3	2.1
Middle management	2.2	2.1	2.0	2.4	2.2
Supervisory	1.4	1.3	0.9	1.4	1.3

**Table 4.10 Assessment of the management levels**

There appeared to be very little differences between the ratings of the executive, top and middle management levels. One reason for this could be that management training in most mining groups was basically the same for these three management levels. The exception would be that the executive and top management levels would be normally more exposed to strategic and analytical management training programs.



**Figure 4.12: Rating of the management levels**

#### 4.3.9 Determination of the management competency gap

In this section the management competency of the four management levels identified would be analysed and evaluated against a proposed competency standard expressed as a percentage (refer section 4.1). A general universal competency standard could not be ascertained from the research work. A management competency standard of 85 per cent was therefore proposed. The difference between the actual rated competency and the proposed standard would constitute the management competency gap.

The task of management is to efficiently perform the management functions of planning, organising, leading and controlling in pursuit of the efficient realisation of the planned objectives (refer section 2.3.2). Successful management is regarded as the key to the success of any enterprise. Success would be directly related to the competency of management.

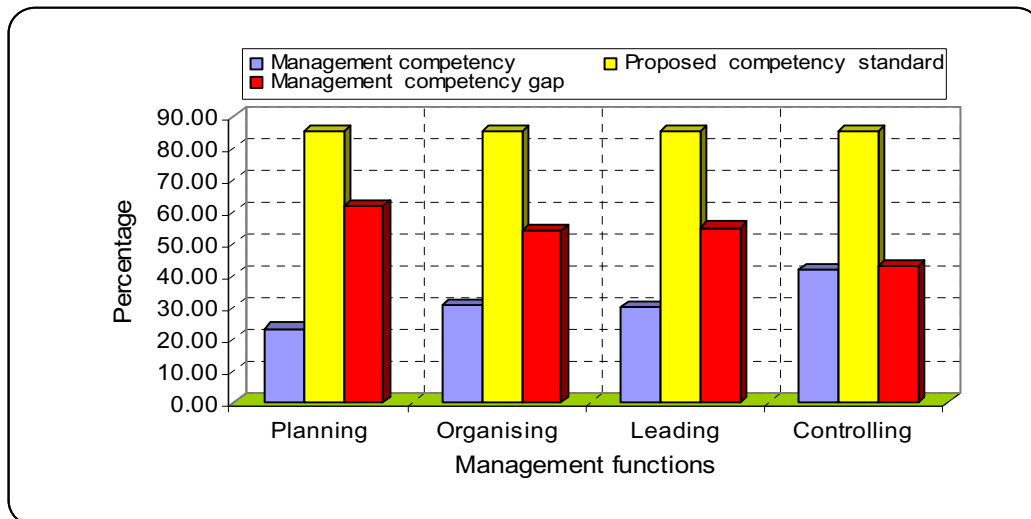
The difference between the average random self rated assessment and the average random rated assessment amounted to 29.07 per cent (refer table 4.11). The main reasons for this large deviation were that managers generally were inclined to overassess their managerial competency and their lack of knowledge of comprehensive management. The difference between the random selected rated sample and the proposed management competency standard represents the management gap. In this case the difference or average management gap is 55.93 per cent (refer table 4.11 and figure 4.13). The average management competency per management function indicated that the largest and smallest gaps existed in the planning and controlling functions respectively (refer figure 4.13).

The accepted management competency gap would be a matter of choice – a serious choice since the greater the accepted gap the greater the deficiency would be and it could result in decreasing competitiveness and eventual closure of the organisation. With a relatively lower competency standard the organisation runs the risk of not competing efficiently in the local and global markets. It could eventually run out of business.

The decision of an acceptable competency standard remains one of the biggest decisions that the organisation could take. It would either have a negative or positive impact on company results in the long run. From a competitive point of view it would be wise for a company to establish what the average competency of the best performing company in that specific field of operations is and then to benchmark itself against that company. But the best approach still would be to introduce a comprehensive, practical and integrated management method which should enable the organisation to ultimately achieve and maintain the proposed standard competency rate of 85 per cent.

Questions	Bulk sample	Random selected sample	
	Self rated	Self rated	Rated
	Averages	Averages	Averages
1	60.00	65.50	32.25
2	60.25	66.75	31.50
3	60.75	63.00	30.25
4	63.50	63.00	30.25
5	55.75	60.75	12.50
6	58.75	61.25	14.25
7	56.00	59.00	18.25
8	56.25	59.00	26.25
9	59.75	62.00	32.25
10	45.00	42.75	5.25
11	59.00	62.50	32.25
12	37.75	44.00	14.25
13	50.75	71.50	41.75
14	51.75	66.75	26.75
15	56.00	61.25	32.25
16	46.50	42.75	6.50
17	58.25	59.00	28.50
18	55.25	58.25	34.50
19	51.75	59.00	34.00
20	53.50	60.00	29.75
21	53.50	65.50	36.25
22	59.00	59.50	37.00
23	47.75	51.75	30.25
24	47.00	52.50	29.75
25	52.50	54.75	25.00
26	60.00	66.25	45.25
27	60.75	68.50	47.50
28	62.50	65.75	49.50
Average	54.98	58.73	29.07

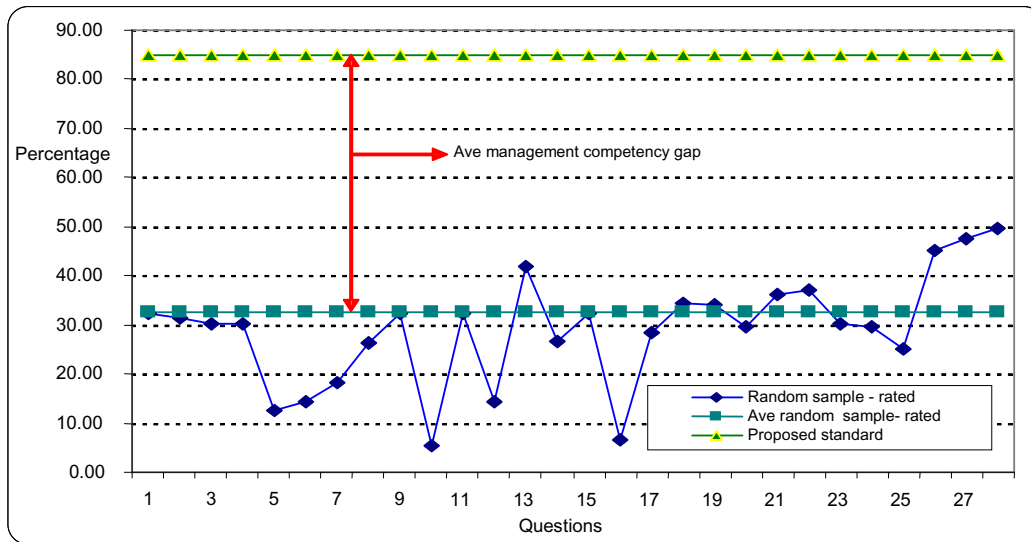
**Table 4.11: Assessment of the sampling in percentage**



**Figure 4.13: The management competency gap per management function**

Figure 4.14 depicts the proposed management competency standard and the management competency gap as identified by the difference between the average rated assessment and the proposed standard. The large gap was regarded as the main reason for the unacceptable performance and deteriorating competitiveness of the industry locally and in the global markets. This

gap should be greatly reduced. If reduced or preferably totally eliminated it would positively reflect on the overall performance of the mining industry. The problem is that a comprehensive, practical and integrated management method does not exist at present (refer section 2.8.2 and 4.2.2.1 (a)).



**Figure 4.14: The average management competency gap**

#### 4.3.10 Evaluation of the Mine Managers' Certificate of Competency and General Management responses

Since the senior mining executives were concerned about the general competency of management in their specific groups, particularly on the value of the Mine Manager's Certificate of Competency or 'ticket' it was deemed appropriate to analyse the responses of the random sample in terms of the two mentioned qualifications (refer section 3.8.1). The random selected sample consisted of a total of 42 responses – 24 and 18 responses from the holders of the 'ticket' and graduates respectively. The objective was to determine whether there were significant differences between the two categories.

##### 4.3.10.1 Evaluation of the responses of the Mine Managers' Certificate of Competency

The results of the responses of the Mine Managers' Certificate of Competency respondents, expressed in percentage, were analysed and are depicted in table 4.12. Although the respondents rated their average management competency at 52.36 per cent and the researcher it at 22.38 per cent both ratings, particularly the rated management competency, are much lower than the proposed standard of 85 per cent. The rated management competency of 22.38 per cent was regarded as the more reliable assessment and should be a reason for serious concern in the mining industry

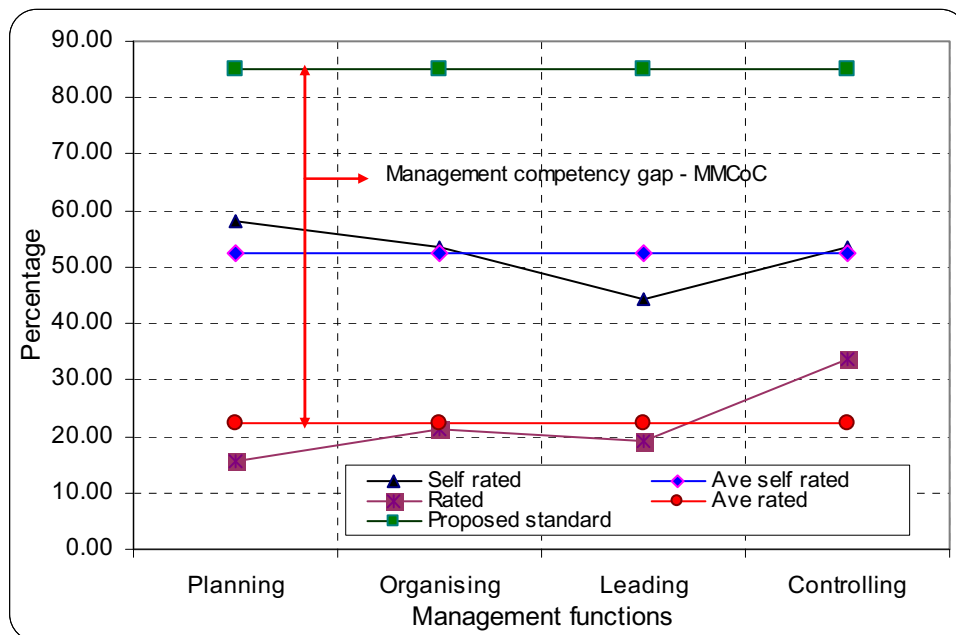
The overall management gap of 62.62 per cent can to a large extent be attributed to the extremely low management competency of 15.50 per cent in the planning function (refer table 4.12 and figure 4.15). Because of the low competency in the planning function the management work can not be performed efficiently by the manager. As a result the other three management functions were poorly

developed and performed with the resultant negative impact on the performance of the organisation (refer section 2.6.2.1).

Management functions	Random selected sample (Percentage)				
	Self rated	Ave self rated	Rated	Ave rated	Proposed standard
Planning	58.25	52.36	15.50	22.38	85.00
Organising	53.54	52.36	21.15	22.38	85.00
Leading	44.27	52.36	19.27	22.38	85.00
Controlling	53.39	52.36	33.59	22.38	85.00

**Table 4.12: Evaluation of the Mine Managers' Certificate of Competency**

The low average rating of 22.38 per cent was a clear proof that the Mine Managers Certificate of Competency was totally inadequate to equip mine management with the required managerial skills. It certainly must impact very negatively on the performance of the South African mining industry. The most important contributing factor to this state of affairs was that a comprehensive, practical and integrated management method and a logical management planning process did not exist in the mining industry (refer section 2.8.2 and 4.2.2.1 (b) (ii)).



**Figure 4.15: Management competency gap of the Mine Manager's Certificate of Competency respondents**

The main deficiencies were that:

- the most probable achievable results were seldom correctly established and stated by the specific incumbents,
- the realisable objectives were as a result never or seldom correctly formulated,
- alteralternative methods were seldom developed by every employee,

- d) the best alternative method was seldom selected,
- e) the work flow was never or seldom developed by each employee,
- f) employees seldom determined the resources required for each task,
- g) the tasks developed during planning were seldom scheduled,
- h) a budget for each developed alternative was seldom compiled,
- i) all risks were not determined by the employees,
- j) policies and procedures were not developed during the existing planning processes, and
- k) the total organisational plan can not be comprehensively computerised.

#### 4.3.10.2 Evaluation of the responses of the General Management random selected sample

The results of the responses of the General Management respondents, expressed in percentage, were analysed (refer table 4.13 and figure 4.16). The average self rated management competency was 63.81 per cent and the average rated management competency was 42.81 per cent which still was 42.19 per cent below the proposed competency standard of 85.00 per cent.

Management functions	Random selected sample (Percentage)				
	Self rated	Ave self rated	Rated	Ave rated	Proposed standard
Planning	60.75	63.81	32.25	42.81	85.00
Organising	61.00	63.81	39.50	42.81	85.00
Leading	60.50	63.81	43.00	42.81	85.00
Controlling	73.00	63.81	55.50	42.81	85.00

**Table 4.13: Evaluation of the competency of the General Management respondents**

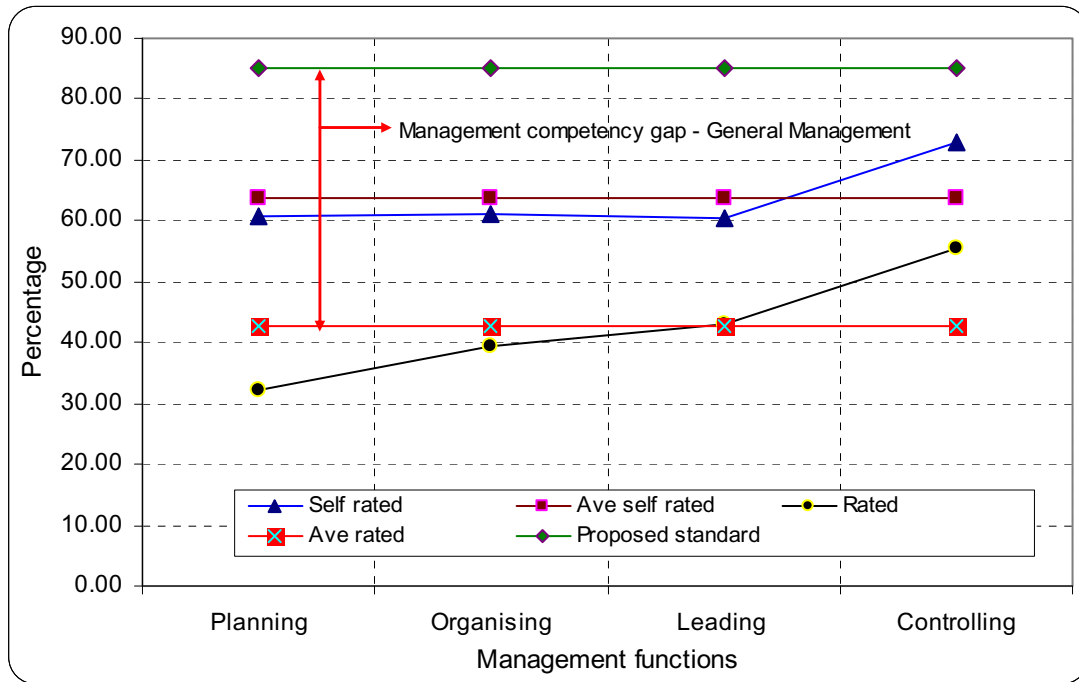
It would appear that there was a significant difference between the competency gaps of the Mine Manager's Certificate of Competency category and that of the General Management category. The main reasons for this deviation were that a comprehensive, practical and integrated management method and a logical management planning process did not exist in the industry. The biggest reason for this deviation was probably the fact that graduated mining engineers received more advanced theoretical training in management principles as part of the degree qualification.

The low management competency in the planning function impacted negatively on the execution of the other three management functions. It can mainly be contributed to the lack of a comprehensive management planning process in the South African mining industry (refer section 2.8.5).

The results were that:

- a) the most probable achievable results were very seldom determined and stated by the specific incumbents,
- b) the reliable objectives were as a result seldom formulated,
- c) alternative methods were seldom developed by every employee,
- d) the best alternative method was seldom selected,

- e) the work flow was seldom developed by each employee, and
  - f) employees seldom determined the correct resources required for each task.
- g



**Figure 4.16: Management competency gap of the General Management respondents**

- h) a budget for each developed alternative was seldom compiled,
- i) all risks were not determined by the employees, and
- j) policies and procedures were very rarely developed during the existing planning processes.

#### 4.3.10.3 Comparison of the average competencies of the Mine Manager's Certificate of Competency and the General Management responses

From table 4.14 it was immediately clear that the overall average competency rate of the two management categories was significantly lower than the proposed standard. This competency gap must certainly impact negatively on the optimisation of the available resources and results.

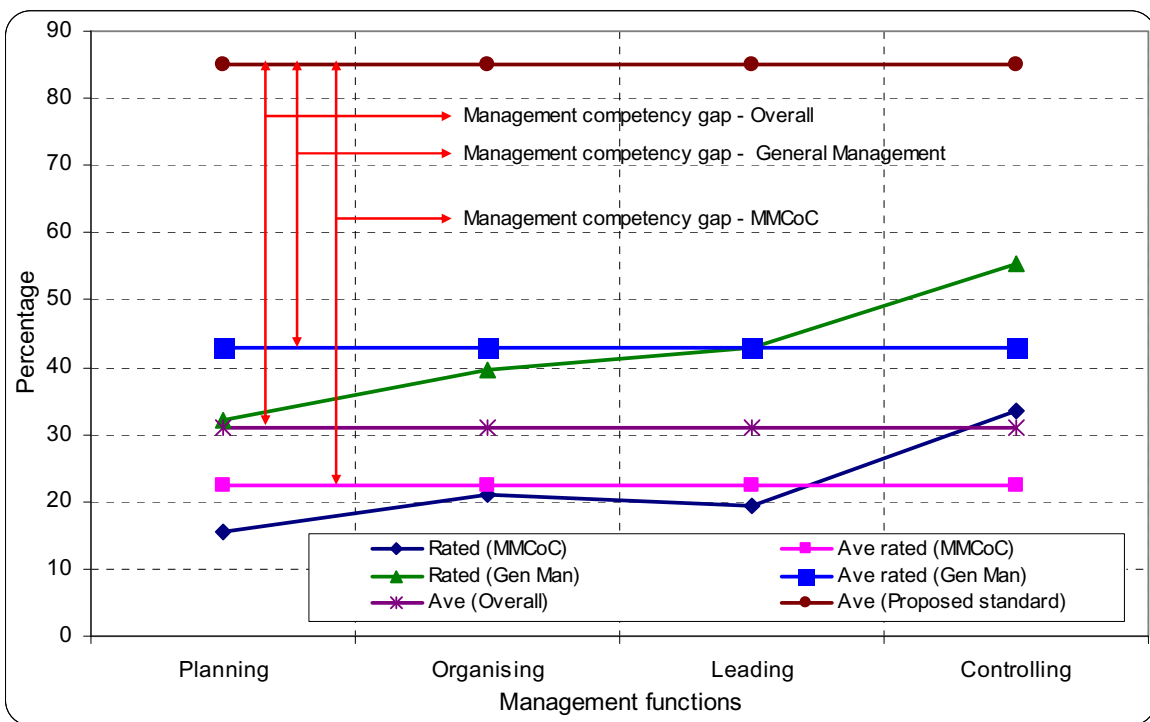
Management functions	Management requirements (Percentage)					Proposed standard
	Mine Manager's Certificate of Competency		General Management		Overall rating	
	Rated	Ave rated	Rated	Ave rated		
Planning	15.50	22.38	32.25	42.81	31.06	85.00
Organising	21.15	22.38	39.50	42.81	31.06	85.00
Leading	19.27	22.38	43.00	42.81	31.06	85.00
Controlling	33.59	22.38	55.50	42.81	31.06	85.00

**Table 4.14: Comparison of the average management competency gaps**

Of these categories the competency rate of 22.38 per cent of the Mine Managers Certificate of Competency respondents was the lowest. The average management competency rate of the General Management respondents was 42.81 per cent which was 20.43 per cent higher than the average management competency rate of the respondents of the Mine Manager’s Certificate of Competency and 42.19 per cent lower than the proposed standard (refer figure 4.17). The average competency rate of 31.06 of the two categories was still 53.94 per cent lower than the proposed management competency standard of 85.00 per cent.

It can be seen that the:

- a) average competency rate of the respondents of the Mine Manager’s Certificate of Competency was the lowest, and
- b) average competency rate of the respondents of the General Management category was the highest of the two.



**Figure 4.17: Comparison of the MMCoC and the General Management responses**

One could argue that any reduction in this competency gap would positively contribute to the improvement of the performance of the mining industry. It then follows that should the industry implement a comprehensive, practical and integrated management method on all the levels of the industry the management competency of all employees on all the levels would increase. Its performance as a result would increase to the extent that it would again become competitive and the leader in the global mining arena. It would also result in the reduction or total elimination of all the concerns of the industry (refer section 1.2.9).



#### 4.4 CONCLUSION

With the analysis and evaluation of the responses, comments and suggestions from the respondents and the observations by the researcher of the management practices in the mining industry it was established that:

- 4.4.1 the administrative management approach was predominantly being utilised in the mining industry (refer section 4.3.2),
- 4.4.2 a comprehensive, practical and integrated management method did not exist in the South African mining industry (refer section 2.8.2),
- 4.4.3 the management practices and programs utilised in the industry were totally inadequate to enable the mining personnel to manage in a comprehensive, practical and integrated manner on all the levels of the organisation (refer section 4.2.2.1 (a)),
- 4.4.4 the Mine Manager's Certificate of Competency was largely outdated and should either be replaced with a comprehensive, practical and integrated management method or be adequately updated (refer section 4.2.2.1 (f)),
- 4.4.5 the planning processes utilised were incomplete and can not enable management to plan comprehensively, practically and in an integrated manner (refer section 4.2.2.1 (b) (ii) and 2.8.5),
- 4.4.6 organisational structures and labour requirements were not scientifically developed and were, in most cases, carry-overs from the past and similar organisations (refer section 4.2.2.1 (c) and 4.2.3.5),
- 4.4.7 alternative methods and work were seldom developed into tasks – the best alternative was not selected and implemented especially at the lower levels (refer section 4.2.3.8),
- 4.4.8 performance standards and risk assessments were set and performed mainly by staff personnel, who in most cases had inadequate knowledge and experience of the practical operations of the company (refer section 4.2.3.9),
- 4.4.9 employees were normally told what results were required from them (refer section 4.2.3.4),
- 4.4.10 policies, procedures and regulations were seldom instituted and when, mainly by top management (refer section 4.2.3.11),
- 4.4.11 employees were mainly recruited, selected, appointed and trained by staff departments (refer section 4.2.3.14),
- 4.4.12 supervisors were seldom involved in the selection and appointment of their own subordinates (refer section 4.2.3.14 and 4.2.3.15),
- 4.4.13 job specifications can not be determined scientifically (refer section 4.2.3.13),
- 4.4.14 training and development programs were carry-overs from the past and in many instances were not mine specific but general group programs (refer section 4.2.3.18),
- 4.4.15 the average measured competency gap of the respondents of the Mine Manager's Certificate of Competency was 62.62 per cent (refer section 4.3.10.1, table 4.13 and figure 4.15),
- 4.4.16 the average measured competency gap of the General Management respondents was 42.19 per cent (refer section 4.3.10.2, table 4.14 and figure 4.16),
- 4.4.17 the average overall competency gap of the two management qualification categories was 53.94 per cent (refer section 4.3.10.3, table 4.15 and figure 4.17), and

4.4.18 management systems can generally not be comprehensively computerised particularly not on all levels of the organisation (refer section 4.2.3.18).

In this chapter it was proved that existing management practices utilised by the mining industry have a great number of deficiencies (refer section 2.8, 4.2.2 and 4.2.3). Consequently the industry can not perform at its optimal level. The mining industry is predominantly making use of the administrative management approach (refer section 4.3.2) This approach was based on the assumption that management was a process. It is not based on a specific management logic.

Allen (1973:47) endeavoured to develop a management logic that would enable the systematic development of management work. This logic proved to be totally inadequate and was not utilised by the industry. To date a management logic that would comply with all the perceived management requirements of a comprehensive, practical and integrated management method does not exist (refer section 2.2.1). Existing management practices are inadequate to enable the management to classify management work and to plan and manage in a comprehensive manner on all the levels of the organisation. It does not facilitate the development of the main objectives of the the company down to the last task and resource required to support it.

The management knowledge and competency of mine management in the South African mining industry proved to be totally inadequate (refer section 4.4.17). It would be logical to assume, with a relative degree of certainty, that the management competency of all mine employees would be equally inadequate. It could be regarded as one of the main reasons for the unacceptable production and safety performance of the industry. The reduction of this management competency gap would greatly improve the performance and competitiveness of the industry as a whole and would benefit the whole country and population.

The existing management practices do not meet with the requirements of a comprehensive, practical and integrated management method (refer sections 2.2.1 and 2.8). The main objective of the next chapter would be to develop the theory for a comprehensive, practical and integrated management method which could be successfully implemented by all the employees on all the levels of the mining industry.

## CHAPTER 5

### DEVELOPMENT OF THE THEORY FOR THE COMPREHENSIVE, PRACTICAL AND INTEGRATED MANAGEMENT METHOD

#### 5.1 INTRODUCTION

From the previous chapters it appeared that a comprehensive, practical and integrated management method in the South African mining industry did not exist (refer section 4.2.3.3 and 4.4.2). The industry utilised mainly the process management approach together with various other short duration management practices available on the management market from time to time (refer section 4.2.2.1 (a) (i), 4.2.3.1 and 4.2.3.3). In chapter 4 it was established that the administrative management approach on its own was inadequate to enable mining employees to manage in a comprehensive, practical and integrated manner from the top level down to the worker level (refer section 4.3.6). As a result the average management competency was extremely low and the industry failed to deliver optimal results (refer section 4.2.2 and 4.2.3). It was established that in practice existing management practices were inadequate to enable the mining industry to manage in a comprehensive, practical and integrated manner (refer section 4.4.3). It appeared that adequate theory to develop such a management method did not exist either (refer section 2.8).

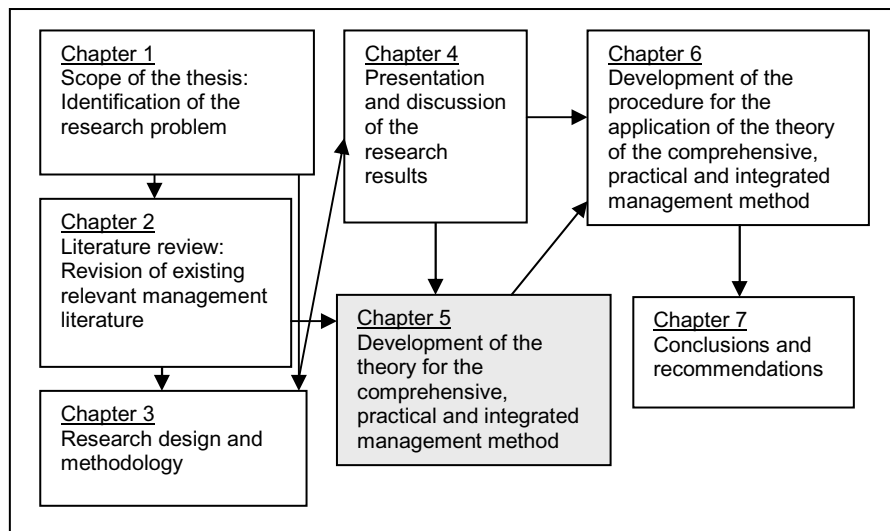


Figure 5.1: Chapter 5 in context to the overall thesis

In chapter 1 it was perceived that some components of the existing management theories and practices could totally or to some extent or in combinations be modified and utilised in conjunction with newly developed theory to develop a comprehensive, practical and integrated management method (refer section 1.5.2.6 and 1.5.2.7). In this chapter the theory for a comprehensive, practical and integrated management method, which could be successfully implemented by all the employees on all the levels of mining organisations, would be developed.

The objectives of this chapter were to:

- identify the relevant management theories that can be utilised in the development of the theory for a comprehensive, practical and integrated management method (refer section 1.7.2.2),
- develop the necessary required additional management theory for the development of the desired theory (refer section 1.7.2.3),
- develop a logical classification for management work,
- develop a comprehensive, practical and integrated management planning process, and
- develop a logical comprehensive, practical and integrated management planning structure (refer section 1.7.2.8).

## **5.2 REQUIREMENTS OF THE NEWLY DEVELOPED THEORY**

The theory for the comprehensive, practical and integrated management method should:

- 5.2.1 be based on or derived from a management logic that would facilitate the complete, development, analysis and utilisation of management work down to the last task and resource,
- 5.2.2 enable all the employees on all the levels of the organisation to manage at all times in a comprehensive, practical, integrated and coordinated manner in order to efficiently realise objectives, utilise resources and timeously accommodate all changes at all times (refer section 2.2.1), and
- 5.2.3 eliminate all the deficiencies identified from and in sections 2.2.1, 2.8 and 4.4.

## **5.3 THEORY SELECTED FROM EXISTING MANAGEMENT LITERATURE**

It was perceived that some of the existing management theories could and should be utilised in the development of the new theory. The existing theories that would be utilised to develop the new theory from were briefly discussed below. The reasons for selecting each of these are summarised in table 5.1.

### **5.3.1 The management concept**

Management was defined as the work that a manager performs to optimise the production resources: people, money, time and material in order to realise the objectives of an organisation most efficiently at all times (refer section 2.3.1 and 2.4.3). Drucker (1968:27) stated that:

“management is concerned with decisions for action. And action is always aimed at results in the future.”

In this thesis it was accepted that this definition indeed applies to every employee on all the organisational levels in all the mining organisations. Although inadequate, the management discipline is still the only known proven method by means of which managers can hope to utilise the

resources of the organisation in a manner that would be competitive and productive. Management needs to make the best with what is presently available.

Drucker (1968:21) remarked that:

“The ultimate test of management is business performance. Achievement rather than knowledge remains of necessity, both proof and aim. Management, in other words, is a practice, rather than a science or a profession, though containing elements of both. No greater damage could be done to our economy or to our society than to attempt to ‘professionalize’ management by ‘licensing’ managers, for instance, or by limiting access to management to people with a special academic degree.”

### **5.3.2 What managers do**

The manager as well as every employee in an organisation has to get results through other people and they are generally seen as being responsible for realising the objectives of the organisation. All employees need to deliver the results required from each of them in the most efficient manner at all times (refer section 2.3.2). It implies that every employee should be able to plan for these results and should have the right, authority and power to take the necessary decisions in order to realise his formulated objectives. Managers and employees therefore have to apply the available management practices as a means to most efficiently achieve the results required from them.

### **5.3.3 Management and stakeholders**

In practice organisations and stakeholders are associated in various ways and as a result are dependent on one another for survival, growth and prosperity. Stakeholders are defined as individuals or groups that have ‘interests, rights or ownership’ in the organisation and its activities (refer section 2.4.8).

In this thesis a stakeholder is defined as any person or entity that is involved with the organisation either as a shareholder, customer, supplier, government institution, community and employee or has for valid reasons a vested interest in the organisation.

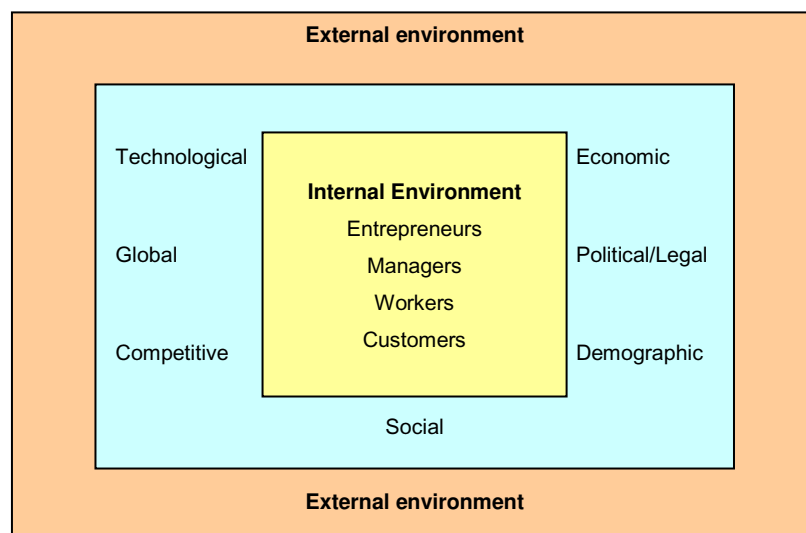
Allen (1973:44-45) indicated that a manager has to contend with four definite organisational interfaces (refer section 2.4.7 and figure 2.6). The employees on the lowest levels have to contend with only three definite interfaces since they occupy the last positions in the organisational hierarchy. It follows therefore that any employee has specific relationships, which he must manage efficiently in order to realise his objectives and to contribute optimally to the achievement of the results of the section, department and company as a whole. To manage in a comprehensive, practical and integrated manner the manager must determine what he requires from each identified stakeholder and in turn what each stakeholder requires from him (refer section 2.4.9).

### 5.3.4 The environment in which management operates

Organisations need to be concerned about factors in the environment especially the external environment simply because it can create uncertainty for management. They must respond timeously in order to prevent catastrophes. The manager and employees must communicate efficiently, integrate and coordinate their activities and that of the departments as well as that of the entire organisation. The organisation should successfully accommodate and adapt to all the influences of the internal and external environments. The performance, results and survival of the organisation are influenced by the internal environment. The influence of the external environment, however, is limited.

McDaniel and Gitman (2008:35) concluded that:

“No one business is large or powerful enough to create major changes in the external environment. Thus managers are primarily adaptors to, rather than agents of, change.”



**Figure 5.2: The total environment**

McDaniel and Gitman (2008:35) classified the total environment into the external, technological, economic, global, political/legal, competitive, demographic and the internal environment (refer figure 5.2). The internal environment includes the interactions between the employee and his specific stakeholders within the organisation’s environment. This environment had up to now greatly been ignored by management theorists and practitioners (refer section 2.4.8).

#### 5.3.4.1 The global environment

Mining organisations operate primarily within their own specific business environments. To be successful they must, at all times, also operate within and in harmony, where applicable, with the

total national and global environments. These environments are continuously changing and are in more than one way competitive amongst different countries and organisations.

#### **5.3.4.2 The macro-environment**

Management must at all times be fully in touch with global as well as local developments and market trends. The desired management method should enable all the employees to:

- a) anticipate or 'pick up' possible potential and real impacts that could either negatively or positively affect the organisation,
- b) be in a continuous position of awareness of potential trends that could present threats, opportunities, weaknesses or strengths,
- c) rapidly adapt to changes with the least detrimental impact on their required results, and
- d) forecast and optimally capitalise on these changes to the benefit of all the stakeholders.

The macro-environment would include institutions such as educational institutions, governmental bodies; competitors and research (refer section 2.4.8 and figure 2.7). Any organisation should identify the relevant environments in which it operates.

#### **5.3.4.3 The micro-environment**

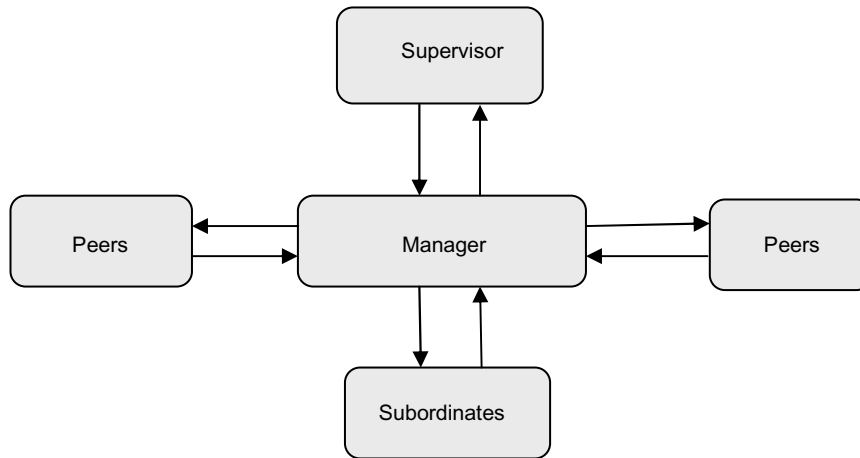
The mines operate within their own micro-environments consisting of the company, the owners, suppliers, stakeholders and the customers. In the new democratic dispensation, great demands, sacrifices and contributions from the mines to the communities, governmental institutions, and sustainable development and especially to the upliftment of previously disadvantaged communities are demanded.

#### **5.3.5 The multiple interface management concept**

All employees in the organisation have to deal with different interfaces which place them in the unique position where only they as individuals have the objectivity, perspective and balance to satisfy the sometimes varying and conflicting needs of subordinates, peers and supervisors (refer section 2.4.7 and figure 2.6). This interaction is necessary and essential for efficient, comprehensive, practical and integrated management for the organisation as a complete system. There will always be interaction between the manager or employee and the stakeholders. All employees should be equipped to efficiently deal with these interactions. The desired management method should fully accommodate these requirements.

The multiple interface management concept implies that employees on all the levels of the organisation interact vertically and horizontally with the relevant stakeholders within their sphere of accountability in order to efficiently perform their work. This statement is true for all employees from the highest to the lowest levels of the organisation. In the case of the worker it should be noted that

he normally has three faces with which he has to interact. It simply means that he has no subordinates reporting to him but that he still must interact with his peers and supervisor.



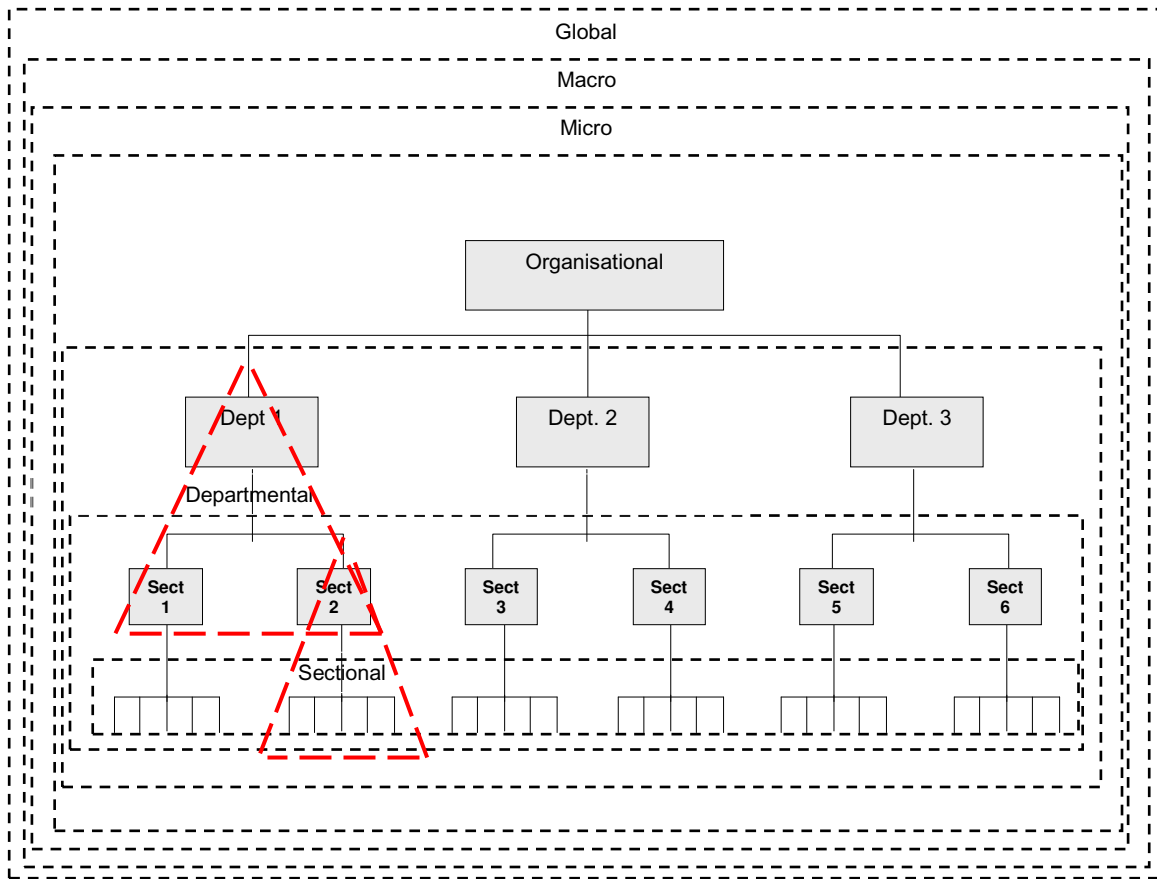
**Figure 5.3: Management interfaces**

All employees must realise that the results required by their supervisors are the sum total of the results that they should obtain from their subordinates and the contribution, participation and support from their peers and supervisors respectively. Equally so are the results of the subordinates, peers and supervisors directly and indirectly influenced by the manager's contribution and support. The results of each employee in the organisation must ultimately contribute optimally to the end result of the organisation (refer section 2.4.7).

In the practical work situation all employees must liaise and interact with all the relevant stakeholders in that specific situation or environment where and when necessary. The different management categories imply that a vertical and horizontal down and up relationship exists in any organisation (refer section 2.4.7 and figure 2.6). This interface environment had up to now greatly been ignored by many if not all management theorists and practitioners. It plays an important role in the optimal performance, coordination and integration of management work in any organisation. Total commitment, cooperation and contribution from employees would be extremely ineffective without the optimum utilisation of this interface.

The internal relationships between the supervisors, peers and subordinates, departments, sections and individual employees should be efficiently managed for optimal performance, integration and coordination of the management work. It is the ideal area where team spirit, loyalty, dedication and positive attitudes could be cultivated, developed, instituted and maintained. The most important relationships are indicated in figure 5.4. The management practices utilised should enable all employees to optimise the multiple interfaces. Existing management practices are incomplete and therefore inadequate to optimally utilise the advantages that should stem from the efficient utilisation of the multiple management interfaces.





**Figure 5.4: The total employee interface environment**

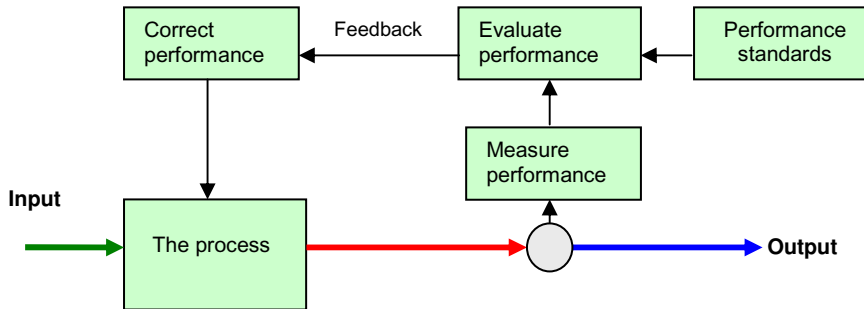
### 5.3.6 The management systems concept

A system consists of inputs into a process in order to produce outputs within the confines of a specific environment along with a feedback loop to measure and correct deviations. This concept contributed greatly to the modern thinking on the management discipline. The organisation consists of many different systems that are dependent on one another for optimal performance. It is a system in itself. The individual as part of the organisation is predominantly operating in a group and is in this respect analogous to a cell in the human body (refer section 2.5.1.2 (c) and figures 2.14 and 5.5).

A business could be seen as a system and therefore each department, section, unit, operation and employee in it is a system and forms an integral part of the larger system or organisation. The system provides the framework within which the employees, individually and in teams, can best work together to realise individual, team and organisational objectives. The system implies that there is a continuous process of input, processing and output.

Every system also contains the facility of measuring work and identifying and correcting deviations. It must use performance standards against which it can measure and evaluate work in progress or completed. The business should in reality be built from the bottom up to the eventual larger

operational unit. The building consist of the development or design of the tiniest task elements into logical systems each requiring specific inputs in order to produce specific results.



**Figure 5.5: The management system**

The systems concept recognises the principle of dependency between production factors, results required, objectives and the processes or work to realise these objectives. In itself it can not support a comprehensive, practical and integrated management method. It would, however, largely be utilised in the development of the new theory.

### 5.3.7 The administrative management approach

In the administrative management approach the management discipline is seen as a process consisting of the four management functions of planning, organising, leading and controlling. These functions constitute the functions of management work where the: planning function is the predetermining of a course of action, the organising function the arranging and relating of work, the leading function the influencing of people to act to accomplish objectives, and the controlling function the assessing and regulating of results (refer section 2.5.1.1.(d)).

This approach was, since Fayol developed it during the 1880s, increasingly practised in France. With the translation in English by Constance Storrs and publishing by Pitman in 1949 of Fayol's book this approach spread rapidly right through the Western countries (Rue and Byars, 1989:48).

The administrative management approach is generally accepted and practiced by most management practitioners. It is the predominant management approach applied in the South African mining industry (refer section 4.3.2). It acknowledges the reality of the systems concept (refer section 5.3.6). It would also form an important component in the development of the theory of the comprehensive, practical and integrated management method. In this thesis it would be proved that it can not entirely be utilised as is but that it needs to be adapted and supplemented by additional newly developed management theory in order to be efficiently utilised in the development of the comprehensive, practical and integrated management theory (refer section 5.4.).

The basic shortcomings with the process management approach are that it:

- 5.3.7.1 still does not enable the employees to manage in a comprehensive, practical and integrated manner,
- 5.3.7.2 would appear that some of the activities of the organising, leading and controlling functions should logically form part of the planning function,
- 5.3.7.3 does not support the logical classification of management work and the development of a logical practical planning process, and
- 5.3.7.4 does not support a logical practical management method to efficiently implement management in practice.

### 5.3.8 The scientific management approach

The scientific management approach utilised scientific methods in studying and analysing individual tasks and establishing optimal working methods and the associated performance standards to maximise efficiency. It focused on individual competencies and the machines and tools that workers use (refer section 2.5.1.1(b)).

In this chapter it would be utilised specifically with the development of tasks and the determination of the total resources required as part of the development of the comprehensive, practical and integrated management theory (refer section 5.4). It would be applied from the top right down to the smallest tasks required to efficiently achieve the required results of the individual employees, sections, departments and the organisation.

The theory of the scientific management approach would be utilised to determine the 'one best way' of achieving a predetermined result on each level for each task of every employee. Eventually it would be utilised in order to optimise the individual and organisational performances.

Existing theory	Reasons for selecting the theory
1. The concept of management	1.1 Emphasises the universal truth that results are required in societies and organisations. 1.2 Results are achieved through the application of the principles of management. 1.3 Management realises the objectives of organisations.
2. What managers do	2.1 Managers get results through other people by applying the techniques of management. 2.2 Managers and the employees are responsible for realising the objectives of the organisation. 2.3 All employees must plan for the required results.
3. Management and stakeholders	3.1 Implies that employees have specific relationships, which they must manage efficiently. 3.2 Employees should determine exactly what all relevant stakeholders require.
4. The environment in which the management and the employees operate	4.1 Management and employees have to achieve optimal results at all times in the environments they operate. 4.2 These environments influence the outcome of results.



	<p>4.3 Management and employees must forecast the impacts of environmental influences.</p> <p>4.4 Environmental influences can be managed.</p>
5. The multiple interface concept	<p>5.1 Various interfaces exist within the same organisation.</p> <p>5.2 These interfaces require specific management interactions.</p> <p>5.3 All employees in these interfaces must interact where required.</p> <p>5.4 All employees must integrate and co-ordinate the relevant management tasks.</p>
6. The management systems concept	<p>6.1 The organisation consists of many dependent systems.</p> <p>6.2 Each of these systems has inputs, which are processed in order to deliver outputs or results.</p> <p>6.3 Each system has the facility to measure and correct sub standard performance.</p>
7. The administrative or process management approach	<p>7.1 Postulates that management is a process.</p> <p>7.2 The process consists of:</p> <p>7.2.1 planning for the desired results,</p> <p>7.2.2 developing the most functional organisational structure,</p> <p>7.2.3 utilising the leading activities in order to influence the subordinates to act favourably,</p> <p>7.2.4 instituting the necessary control measures to ensure the achievement of the planned results, and</p> <p>7.2.5 the basic philosophy of this approach is planning, organising, leading and controlling.</p>
8. The scientific management approach	<p>8.1 Utilises scientific methods to study and analyse individual tasks.</p> <p>8.2 Establishes the most optimal working methods.</p> <p>8.3 Maximises efficiencies.</p>
9. Activity – based management	<p>9.1 Concentrates on the cost aspects of each activity.</p> <p>9.2 Breaks work down into the smallest elements.</p> <p>9.3 Cost of the activities is regularly checked.</p> <p>9.4 Is not a comprehensive method on its own.</p>
10. The management planning processes	<p>10.1 Consists of different steps to compile a plan.</p> <p>10.2 The existing planning processes are inadequate.</p> <p>10.3 Many versions of this process are proposed.</p>
11. Management classification	<p>11.1 No uniform classification exists.</p> <p>11.2 The Allen classification is the only one but is not practically applicable.</p> <p>11.3 It is not a logical systems directed process.</p>

**Table 5.1: Selection of the relevant theory**

### 5.3.9 Activity-based management

Activity-based management concentrates mainly on the activities or tasks and the associated cost aspects of each activity only. It is normally utilised to break the work down into elements or activities in order to determine whether the specific activity is required in the production process. If not necessary or if ineffective to the judgment of the project team it is either eliminated or replaced by a more effective activity. The cost of each activity is controlled on a regular basis (refer section

2.5.2.4). This management technique is basically a sub-component of the work breakdown structure management technique (refer section 2.5.2.3). It was not derived from or a logical outflow of a comprehensive, practical and integrated management method. It recognises the relationship between work and costs and the effect that it could have on the total results of the organisation. It was for this reason utilised in the development of the new theory.

### **5.3.10 Management planning processes**

The management planning processes in the literature invariably vary and differ from each other. They apparently depend on the preference of the specific management author or practitioner. They normally consist of different steps that differ from author to author. None of the planning processes, described in the available literature, consists of a complete logical comprehensive sequence of steps that could be utilised or modified to serve as guidelines for the planning function in a comprehensive, practical and integrated management method (refer section 2.6.2.1).

It would appear that a uniform planning process does not exist at present (refer table 2.4 and section 2.6.2.1 (c)). Where the primacy of the planning function is strongly emphasised and practised respectively by most if not all management theorists and practitioners this shortcoming became a matter of grave concern (refer section 2.6.1 and figure 2.21). Some of the terminology of present planning processes would be utilised in the development of the new theory.

### **5.3.11 Management classification**

The logic or set of rules to systematically classify management work in order to develop and manage an organisation at present does not exist. The analysis of the management philosophies of the twelve management theorists indicated that they were only in agreement as far as the activities of the controlling function of the management discipline were concerned (refer table 2.4). On the activities of the planning, organising and leading functions there were major differences among them (refer section 2.6.2.6).

Fayol was the first to see the need for the classification of management work (refer section 2.5.1.1 (d)). He concluded that management is a process and as such the activities of management should support this view. He classified management work into the four main management functions of:

- planning,
- organising,
- leading, and
- controlling.

Some theorists developed these functions further, into management activities. Allen (1973:47) developed a hierarchy for management work and classified it into:

- classes,
- orders,

- functions,
- activities,
- segments, and
- elements.

This classification was and still is at present widely accepted by many mine managers (refer section 2.6.2.8 (d) and table 2.6). It is in fact the predominant management classification in the mining industry (refer section 4.3.2). The problem, however, was and still is that the classification was not derived from a practical workable management logic. Consequently serious difficulties were and are still being experienced to logically implement management practices and structures from the top down through the different levels to the last employee in the hierarchy and finalise it from the bottom up to the top. This classification makes it impossible to logically develop the organisational structure and the associated technical work. It does not allow for the comprehensive application of management in practice.

More recently Dr W J de Villiers, the chief executive officer of the General Mining and later the General Mining Union Corporation mining groups respectively, published his book 'Principles of Decentralised Management'. In this book he proposed a more practical approach to the challenge of implementing management principles in the practical situation. He specifically differentiated between, what he termed the mechanics and the dynamics of management. Under the mechanics he included the management functions of investigating and forecasting, planning and organising. Under the dynamics of management he included the management functions of commanding, coordinating and controlling (De Villiers, 1973:10-11).

This distinction was based on the reasoning that the mechanics of management deal with the requirements, which need to be established or put into place before the human, capital and material resources could be efficiently utilised. The dynamics of management are concerned with the people doing the work. This classification emphasised the important truth that one must plan the results one requires, in other words one would need a plan, the means to achieve the planned results, implement the plan and control the performance.

It is important that one should plan, implement and keep the management process in motion (refer section 5.5.1). This simply implies that every employee should be adequately involved in the managing of the planned work necessary to achieve the results required from him. This philosophy was, however, equally as impossible as all the preceding ones to implement in practice mainly because it was rather a statement and not developed from a practical management logic point of view to its final conclusion.

Different views on the classification of management work were not new. It was in fact a controversial issue, which, over time, led to many arguments and discussions amongst many management theorists and practitioners. The existing classification of management work was not logically developed from the requirements of the management work and was of no or at best of little value in

the application of management work in practice. It is felt that a logical classification is necessary in order to ensure the uniform, consistent classification and efficient application of management work. It would be shown in the sections to follow that a significant proportion of the management work, traditionally classified under the organising, leading and controlling functions of the management discipline is and must in practice be performed as a logical development of the planning function. The reality is that management functions are so intertwined with the work of the other management functions that it is imperative to use a logic based on natural management requirements.

In the sections to follow it would be endeavoured to develop a management logic that would enable the management and employees in the organisation to logically analyse and develop management work from the start to its final conclusion. This logic should provide the rules or means to enable every employee to comprehensively manage for the results required from him.

### **5.3.12 Formulation of objectives**

Objectives were defined as the end results that must be planned for, the leading guides toward the achievement of these results. They set the continuing directives for workers, sections, departments and organisations and represent the performance standards against which progress and deviations could be measured, evaluated and where necessary be corrected. Without objectives it would be impossible to integrate and coordinate management work in order to optimise the planned results of the organisation. Presently significant differences exist in the terminology and interpretations of management literature.

For the development of the comprehensive, practical and integrated management theory it would be necessary to establish a uniform logical terminology and definition of this important component of the management work (refer section 2.6.2.1 (d) (iii)). Objectives would throughout play an important role in the development of the new theory. The integration and coordination of objectives is a major corner stone in the establishment and maintenance of the perceived comprehensive, practical and integrated management theory.

#### **5.3.12.1 Specific objectives**

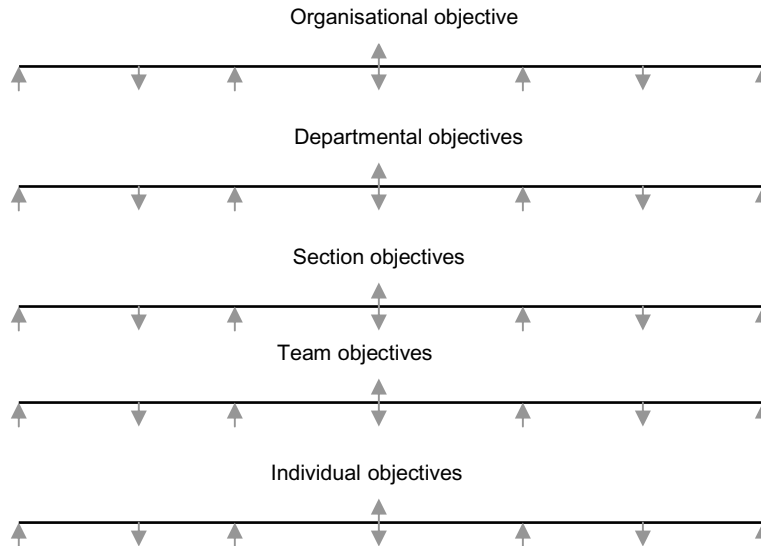
Different kinds of objectives are used in the existing management literature. This causes confusion rather than unity of effort. Objectives should be specific where results are to be achieved within a stated time frame. Specific objectives are the building blocks in the realisation of general objectives. It follows then that correctly formulated specific objectives would provide the required directives for the optimal realisation of individual, section, departmental and organisational objectives.

In formulating specific objectives the responsible employee should:

- a) identify each component of the results required,
- b) base the objective on the results required, and
- c) define each objective in futuristic terms (always start with "To").

### 5.3.12.2 General objectives

A general objective is an objective that defines the results required from a complete task. It is made up of the various specific objectives within that complete task. It is normally based on the achievement of longer-term results and should form the basis for the sections, departments and the organisation as a whole.



**Figure 5.6: Hierarchy of objectives**

### 5.3.12.3 Formulating challenging objectives

The relevant stakeholders must as far as is practically feasible formulate objectives jointly. Objectives should be formulated in terms of the systems concept (refer section 5.3.6). Figure 5.6 indicates that the defining, integration and coordination of objectives must commence at the top level and cascade down to the lowest levels and be verified up to the top level.

During the planning process objectives are summarised, coordinated and integrated upwards and horizontally. This will ensure that all objectives would eventually culminate in the general objective of the manager and the organisation as a whole.

In order to formulate the most realistic and challenging objectives it is important to:

- a) take performance of the past into account,
- b) establish realistic performance levels,
- c) take cognisance of competitors' performances,
- d) use measurable performance standards,
- e) include improvement factors where applicable, and
- f) ensure sufficient:
  - i) communication and participation,



- ii) Integration and delegation,
- iii) coordination, and
- iv) recognition.

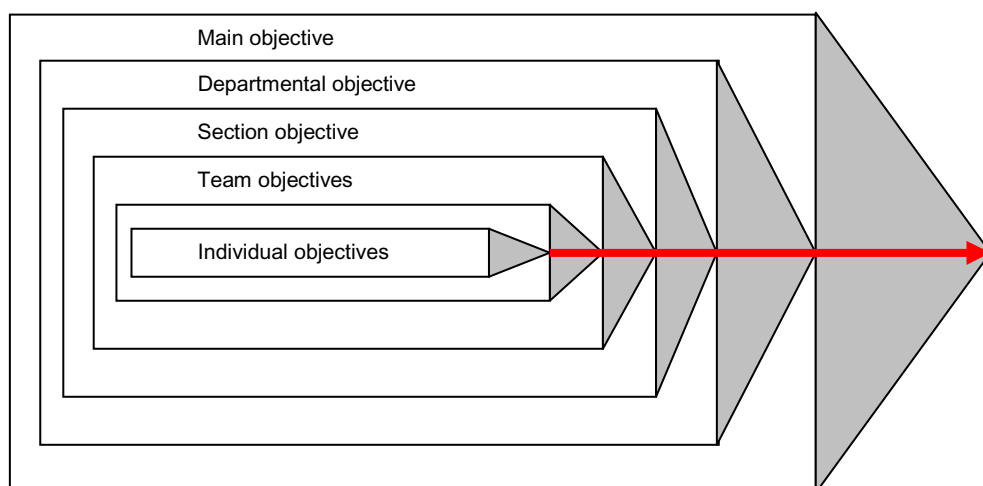
#### 5.3.12.4 The alignment of objectives

The alignment of objectives can best be achieved when the management logic is meticulously adhered to. From figure 5.6 and 5.7 it is clear that the objectives of the individual workers should jointly culminate into the objective of the team and also satisfy the objectives of all the stakeholders and sections in the specific situation. The objectives of the sections should in turn culminate into the objectives of the departments and again the objectives of the departments into the general objective of the organisation.

It is imperative that all the employees in the specific situation are fully involved in the:

- development of the most probable achievable results,
- formulation of the objectives,
- planning of the best method with which to achieve the most probable achievable results in the most efficient manner, and
- the means to control the work in progress and completed.

In figure 5.7 the principle that the organisation is a system and that the output of the subsystems must optimally contribute to the larger objectives of the system and the organisation as a whole is emphasised. Existing management practices do not facilitate a comprehensive company wide compilation, integration and execution of plans. Management by Objectives (MBO) is the management technique that is presently mainly being used for this purpose (refer section 2.5.3.1).

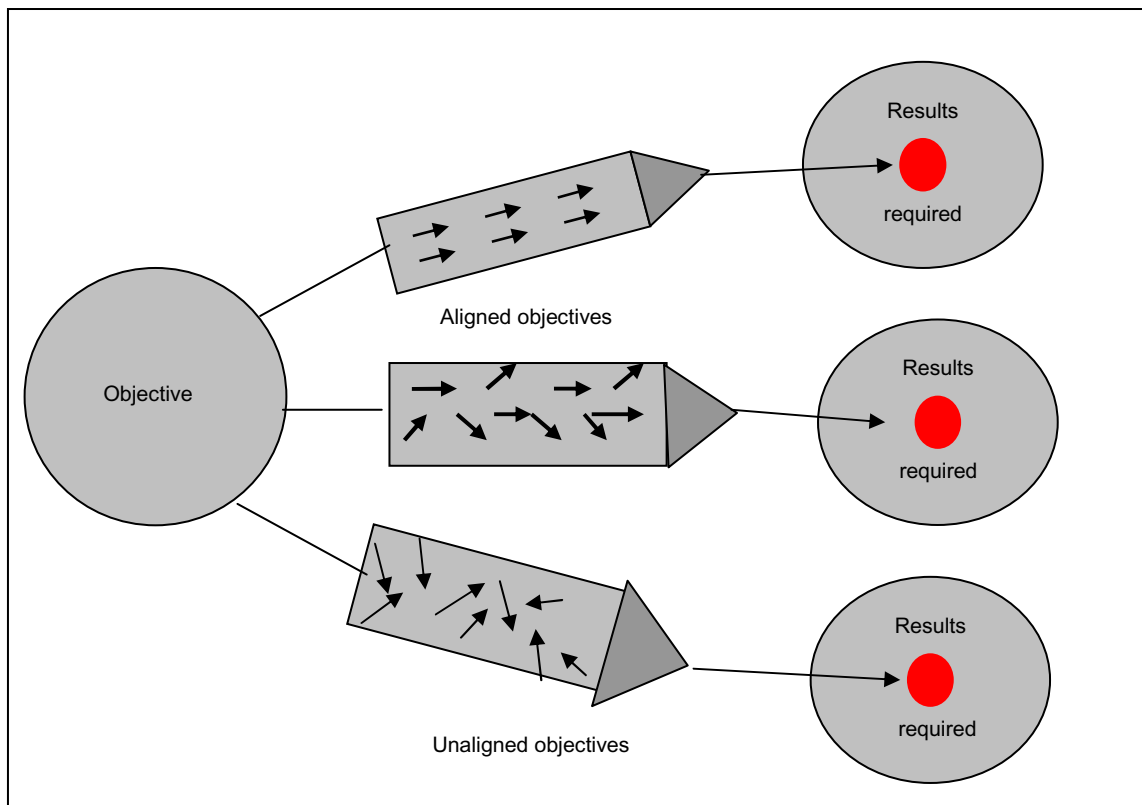


**Figure 5.7: Alignment of objectives**

The application of a comprehensive, practical and integrated management method would make it feasible to comply with these requirements. The more a comprehensive, practical and integrated management method is applied the more the objectives in the organisation would be aligned and the more the performance would approximate the optimal limit as illustrated in figure 5.7.

### 5.3.12.5 Optimisation of objectives

It would appear that due to the lack of a comprehensive, practical and integrated management method, the objectives of the individuals can not be optimally aligned and hence the sub-standard performance. In actual fact the organisation is mostly not even aware of the reality that the individual, sectional or departmental objectives are not properly aligned simply because the means for developing the most realistic aligned objectives and recognising substandard performance are inadequate.



**Figure 5.8: Optimisation of objectives**

In an effort to overcome or compensate for this deficiency many organisations resort to programs such as benchmarking, managing by objectives, work breakdown structures and activity-based management to name just a few (refer section 2.5.2.3, 2.5.2.4 and 2.5.3.1.). These management programs and techniques, however, only serve at the most a few of the management functions and would therefore not solve the problem as a whole in the most efficient manner.

In figure 5.8 the tendency of production units and organisations in general to adjust or to plan their operations to the level of current performance is illustrated. Normally they plan at previous

performance levels (B) but more often than not end up underperforming on this budget (A). With the introduction of a comprehensive, practical and integrated management method they would be able to review their performance and revise the plan with a view to align their objectives in order to optimise the resources at their disposal (C).

With a comprehensive, practical and integrated management method it would be possible for the organisation to logically plan from the top down to the lowest position and the necessary task elements. This would facilitate the optimisation of each method to achieve optimal results from the top down to the bottom of the organisation. It would be possible to optimally align individual, departmental and company objectives.

### **5.3.13 Past attempts to develop a logic for and a system for classifying management work**

Allen (1973:4-12) reasoned that the different human drives or urges in what he called the 'process concept of human behaviour' initiate specific actions by people. Human action is actually a process that follows a specific logic or principles of reasoning. All human action is motivated by the body's need to satisfy specific needs. Specific drives are safety, hunger, sex, desire to perform, achievement and self-protection.

He was of the opinion that in order to determine their duties managers should, as accurately as practically feasible, employ a clear and verifiable logic relevant to the specific field of management (Allen, 1973:45). This logic should be true for every employee who needs to achieve results. Note that he was theorising on what a manager should be doing but not on how he should be doing it. This reasoning again proved that at the time of developing his theory an all-inclusive management practice did not exist. The main deficiency was that management could not adequately organise management knowledge and information in a logical manner.

The sciences and other disciplines also, to some extent, experienced the problem of logical and consistent classification. Man started to classify the many different kinds of animals, plants, insects, chemicals, cells and atomic particles, to mention only a few, by developing a taxonomy or a system of classification, based on specific and unique characteristics of the specific discipline. This enabled science to classify new and recently discovered items within these categories. A taxonomy or system for the classification of management has as yet not been developed.

Allen (1973:46) came to the conclusion that:

"We can study management in an orderly and rational fashion only if we organize our information in a logical way. Applied to the work a manager performs, this means that he should have some system for dividing the work that he does into categories, which can be precisely defined. To the extent he uses the same system of classification used by other managers – both within and outside his organisation – he can compare his work with theirs."

Allen (1973:46) concluded that:

“However, this foundation has not been laid for management. We lack a system for sorting, categorizing, labelling, and defining new and old management information. A commonly understood classification of management work is a tool which will prove indispensable to the progress of the management profession. Such a taxonomy will facilitate the communication and dissemination of new management knowledge and will provide the basis for a logical definition of management terms.”

From chapter 2 it appeared that the logic he proposed still did not meet with the requirements for a comprehensive, practical and integrated management method (refer sections 2.2.1 and 2.6.2.8). His proposed logic failed to enable management to apply management work in a comprehensive, practical and integrated manner at all the levels in the organisation. He could not extend his classification of management work to the smallest tasks. Furthermore his attempt to classify and develop technical work in a similar way failed completely (refer section 2.6.2.8 (d) and 2.6.2.8 (e)).

None of the management theories depicted and discussed in table 5.1 constitute a complete comprehensive and integrated theory. They are basically sub-components of a complete comprehensive and integrated management method. They substantially differ from each other. It will not even be possible to combine these theories into a single comprehensive and integrated theory. It would, however, appear that they could partly to some extent, be modified and utilised in the development of a comprehensive management theory.

#### **5.4 DEVELOPMENT OF THE COMPREHENSIVE, PRACTICAL AND INTEGRATED MANAGEMENT THEORY**

In this section a management logic would be developed in order to develop the theory for the comprehensive, practical and integrated management method. The theory would then be evaluated against the performance requirements of this method (refer sections 2.2.1 and 5.4.2). Work is seen as consisting of mechanical and human work. Human work consists of management and technical work (Allen, 1973:48). Since human action is a process aimed at the satisfying of specific predetermined needs within a logical system some of the elements of the process or administrative and systems management approaches would be utilised in developing the required logic (refer section 2.5.1.1 (d) and 2.5.1.2 (c)).

##### **5.4.1 Premises on which the comprehensive management logic is based**

The comprehensive management logic is based on the premises that management:

5.4.1.1 is work that predetermines and achieves results,

5.4.1.2 is a science and should comply with specific logical reasoning,

5.4.1.3 depends on specific principles of human and organisational needs and behaviour, and

5.4.1.4 is a logical process aimed at satisfying specific needs.

### 5.4.2 Requirements of the comprehensive management logic theory

The developed comprehensive management logic theory should:

- 5.4.2.1 be based on or derived from a management logic that would facilitate the complete analysis and utilisation of management work,
- 5.4.2.2 enable all the employees on all the levels of the organisation and the organisation as a whole to manage at all times in a comprehensive, practical, integrated and coordinated manner in order to efficiently realise the objectives, utilise resources and accommodate all changes at all times (refer section 2.2.1),
- 5.4.2.3 facilitate the classification of management, logical planning processes and structures, and
- 5.4.2.4 eliminate all the deficiencies listed in section 2.8.

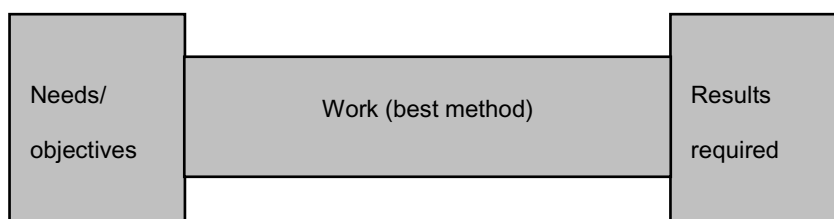
### 5.4.3. The comprehensive management logic

The comprehensive, practical and integrated management theory is developed from the teleological drive or the application of genetic energy to fix the ends to be achieved point of view. To put it more practical it is the drive to satisfy needs or to achieve results. It is therefore based on a specific logic. This reasoning should be true under all management conditions and circumstances. Every employee from the lowest to the highest level in any organisation from one-man concerns to ultra-large corporations should be able to understand and apply this logic.

Managers and employees have needs that:

- vary with time,
- vary with conditions and situations, and
- must be satisfied.

Needs are triggered by challenges, instincts, routine actions, opportunities, dissatisfactions, deviations or instructions to mention only a few. A need can only be satisfied by the required results. If a person is hungry that person has a need for food. The result that the person wants to achieve is to be not hungry anymore. The person therefore needs to eat enough food in order to completely still his hunger. Only then the person would be satisfied. Results do not just ‘happen’, - they must be ‘earned’ or acquired, preferably in the most efficient manner. The person, therefore, has to do something to acquire the food in order to move from the hungry or unpreferred condition to the preferred condition of not hungry.



**Figure 5.9: The Result – Objective – Work (Dog bone) concept**

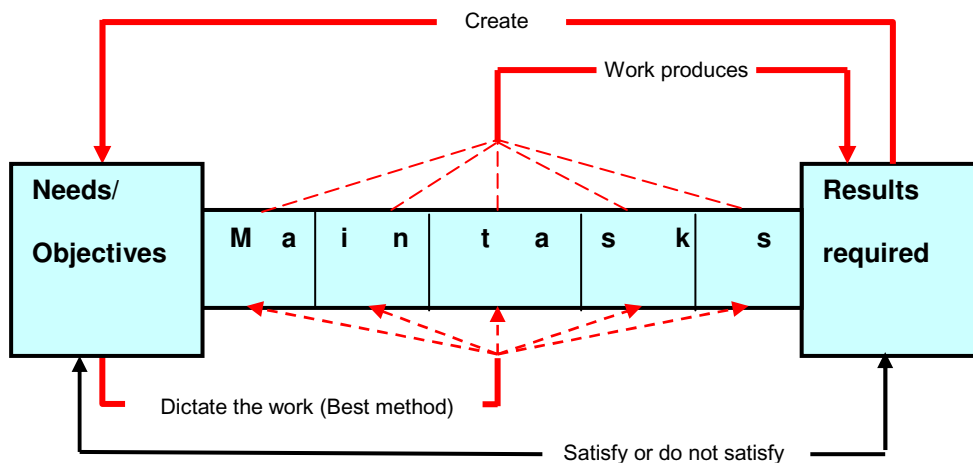
The unpreferred condition creates a need or objective. In the comprehensive management logic a need or objective and a result would be treated as synonymous. The only difference between a need and a result is time. The moment when the objective is satisfactorily realised it becomes the required result. It should be noted that there normally would be more than one method with which to achieve the required result. The best method should be determined and applied.

The comprehensive management logic reasoning could, therefore, be stated as follows:

- **The unpreferred condition creates a need.**
- **The need would only be satisfied by the appropriate results required.**
- **The required results, therefore, create an objective.**
- **The objective dictates that work should be performed.**
- **The work (best method) should produce the required results.**
- **Progress with the work should be adequately controlled.**
- **The results should satisfy the objective and therefore change the unpreferred condition to the preferred condition, and**
- **Where the results do not satisfy the objectives, timeous corrective action should be taken.**

This concept demonstrates the basic management truth, which developed as part of the evolution of mankind, that for any person to achieve the planned results that person must first determine what results would satisfy his needs and whether those results are in fact realistically achievable. Only then he would have a more realistic idea of what his guiding directive or objective should be and then he could develop the best method to achieve the results required (refer figure 5.9). Logically it follows then that for the most efficient management performance:

**The results required, need to be stated first, thereafter the objective should be formulated, and then the work or the best method with which to achieve the results required should be determined and efficiently performed.**



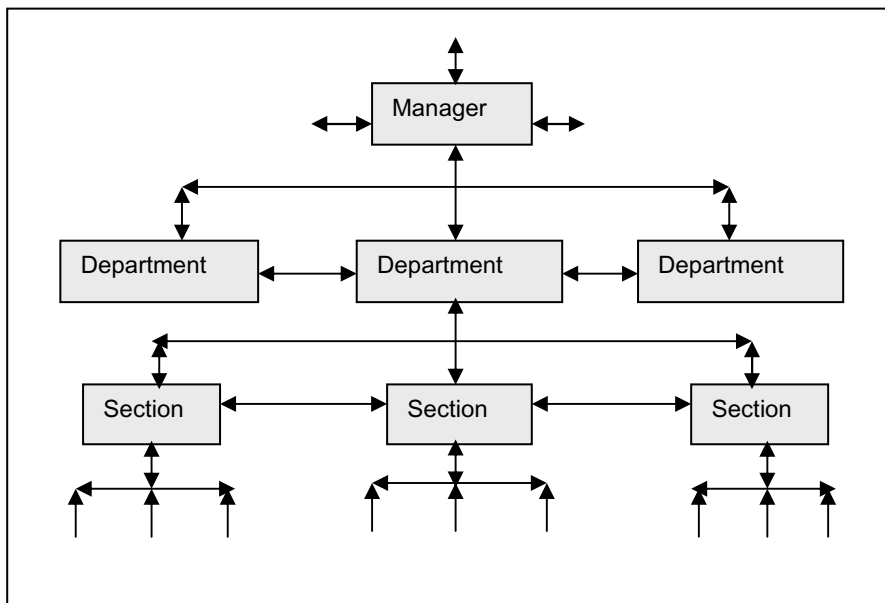
**Figure 5.10: The comprehensive management logic development**

The results required would become the standards of performance or output, which should be used to measure, evaluate and where and when necessary correct the work in progress or performed (refer section 5.3.6 and figure 5.5). It is important to realise that whenever the required results change the relevant objectives should be evaluated and where necessary be reformulated and the best method with which to achieve the changed results be developed and used.

From figure 5.10 it follows logically that:

- the required results create the needs or objectives,
- the needs or objectives dictate the work to be performed,
- the work produces the required results,
- the required results would or would not satisfy the needs or objectives, and
- management is a natural logical process.

When the results do not satisfy the needs or objectives the deviations must be measured, evaluated and the appropriate corrective action must be planned and instituted. The progress with the plan must be regularly controlled. In the practical situation the manager would determine the vision, mission, strategy and the general objective of the organisation. He would then delegate the results that he requires from his immediate subordinates and stakeholders together with the necessary authority and accountability to each subordinate and stakeholder. This procedure should be followed right through the organisation down to the operators (refer figure 5.11).



**Figure 5.11: Organisational interfaces**

Each employee must contribute to the realisation of his supervisor's objectives and must formulate his own objectives, develop his own work and coordinate and integrate his work with that of his immediate stakeholders and that of the organisation. It implies that he must develop and analyse the necessary tasks that would produce the results required from him. In the process he must liaise with his stakeholders (refer section 5.3.5, figure 5.3 and 5.4). He has to plan comprehensively for

the achievement of the results required from him and ensure that his stakeholders know and understand exactly what he in turn requires from each of them (Drucker, 1968:167).

Every employee must:

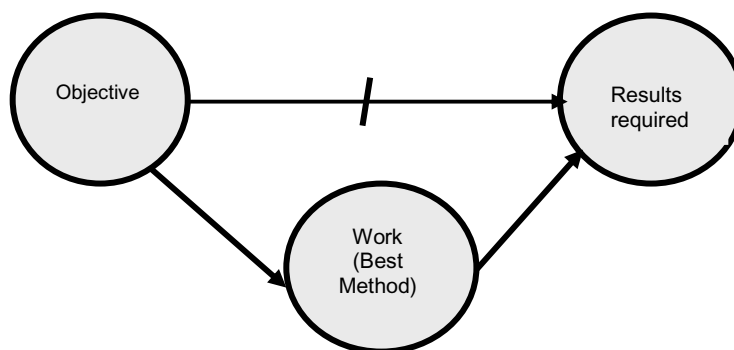
- know or determine exactly what results are required from him,
- have the necessary accountability and authority to take the necessary decisions to achieve the required results,
- have the competence to develop his own plan,
- implement the plan, and
- control the execution of the plan.

The tasks that the organisation requires must be developed from the top to the bottom of the organisation and then coordinated, integrated, optimised and finalised from the bottom upwards. The analysis has to commence with the results required by the manager. From this point the analysis determines step by step the required results, objectives and what work has to be performed.

Drucker (1968:169) stated that:

“What managerial jobs are needed and what each of them is should always be determined by the activities that have to be performed, the contributions that have to be made to attain the company’s objectives.”

For the achievement of results work has to be performed. Work is performed by people therefore the manager gets results through people. The more competent the people are the better the results would be. The best method performed by the most competent people should yield the optimum results. Diagrammatically it can be represented as depicted in Figure 5.12.



**Figure 5.12: The Objective – Work – Results process**

In view of the above reasoning it could be argued that when an employee is competent and has a clearly formulated objective and applies the best method then his performance would be the most efficient. Therefore one could reason that efficiency is the achievement of the most optimal results through the application of the best method. Efficiency is defined differently by most individual



management theorists. The most generally accepted definition is that efficiency is doing the right thing in the right way. In this thesis efficiency would be defined as the achievement of the optimal results through the efficient application of the best method, in other words maximum performance.

It follows logically that in order to finalise and organise the work of the organisation the management process must be initiated at the top and cascaded down to the bottom and then be coordinated, integrated, optimised and finalised from the bottom up to the top again. It is a process that could be repeated several times before optimal results have been established and complete agreement has been reached. The operators would perform the basic tasks in the organisation and therefore they would have to develop their own work flow down to the smallest tasks.

Drucker (1968:173) said that:

“Seen this way, the jobs of higher management are derivative, are, in the last analysis, aimed at helping the firing-line manager do his job.”

The comprehensive, practical and integrated management logic is a natural human law. It is a logical human reaction to satisfy human needs. Ackroyd and Fleetwood (2000:26) argued that to define management one should not look into the actions but rather into the logic of management.

The scientific management approach was developed and justified mainly from the need to improve productivity. It was and still is extensively utilised to this day with great success because it involves the systematic and scientific analysis of the basic work required (the best method) to produce the required results in the most efficient manner (refer section 2.5.1.1 (b), table 5.1, figure 5.6 and 5.7).

#### **5.4.4 Basis of the development of the comprehensive, practical and integrated management theory**

The management work initiates the management process and therefore the technical work must be a derivative or logical outcome of the development of the management work. Although the technical work is a derivative of the management work the two categories are intertwined in the management process. The logical development of the physical work and all other resources required would be developed from the correct application of the comprehensive management logic. The technical tasks must be developed down to the smallest task elements practically necessary in order to realise the objective efficiently. Management theorists and practitioners in the past and up to now have failed to develop a comprehensive management logic.

The comprehensive, practical and integrated management logic commences with the most probable achievable results. This rule is applicable to every employee in the section, department and organisation (refer section 5.4.3 and figure 5.9 and 5.10). The logic differs from the one proposed by Allen (refer section 2.6.2.8 (a) and (b)). Allen’s logic commenced with the objective to be realised. He did not clearly state how exactly the process should further be developed.

The comprehensive management logic consists of the following logical sequence of tasks:

- establish the most achievable results,
- formulate the objective,
- determine the best method with which to achieve the required results,
- implement the best method, and
- control the execution of the plan.

## 5.5 DEVELOPMENT AND CLASSIFICATION OF THE COMPREHENSIVE MANAGEMENT LOGIC THEORY

### 5.5.1 Development of the comprehensive management logic theory

The objective of any organisation is to achieve the most optimal results at all times. There could possibly be more than one method with which to realise the objective. Normally there would be only one best method. The challenge is to logically and scientifically determine this best method. From the preceding reasoning it could be concluded that the:

- required results would be the most probable achievable results under the specific circumstances,
- the objective would be to realise the most achievable results efficiently at all times, and
- best method would be the method that would result in the most efficient achievement of the required results.

Utilising the comprehensive management logic, developed in section 5.4.3, the logic could be depicted as in figure 5.13 below (refer figure 5.9 and 5.10). Every one of the selected alternative methods should be developed first into tasks and the tasks and resources determined and analysed before the best method could be selected.

In this thesis the following terminology would be used:

- main tasks instead of management functions,
- supporting tasks instead of activities,
- controlling tasks instead of elements, and
- tasks further down the line where and when necessary.



**Figure 5.13: Development of the work flow of the best method**

Planning is, according to most management theorists, the defining of the objectives for the future performance of the organisation, the determining of the resources required and the best method of how to go about realising these objectives in the most efficient manner over the planned period. It follows that a plan could only be effective if the main tasks of the best method is delegated to the relevant accountable employees and if it is successfully being carried out. This implies that the progress and performance should be periodically controlled or measured, evaluated and where and when necessary be corrected timeously (refer section 2.6.2.1).

Therefore the best method to manage is broken up into the following main tasks:

- plan,
- implement the plan, and
- control the progress with the plan.

The best method to manage could also have been broken up into the main tasks plan and operate the plan which would consist of the controlling tasks of implement and control the plan. The complete development of the both sets of main tasks should eventually result in the same results. This reasoning demonstrates that there could be more than one method to achieve the required results.

### **5.5.2 Development and analysis of the comprehensive management work**

In order to analyse and classify the management work the work flow development or 'dog bone' concept would be applied (refer section 5.4.3 and figure 5.9, 5.10, 5.12, 5.13 and 5.14). The objectives with this concept are to:

- systematically determine the results required for each task and method,
- determine the performance standards for each task and resource,
- ensure that the objectives to guide the work necessary to achieve the required results are correctly formulated, and
- ensure that the work necessary to produce the required results would be developed logically, correctly and systematically.

In order to comply with the requirements stated in sections 5.2 and 5.5.2 above the work flow should be developed in the following sequence:

- identify the relevant triggers,
- evaluate the relevant factors,
- develop the most probable results,
- formulate the objective,
- determine the work or best method,
- develop the best method into main, supporting and controlling tasks, and
- develop tasks further down to the smallest tasks necessary (refer figure 5.14).

5.5.2.1 For each main task:

- a) determine the results required,
- b) formulate the objective,
- c) develop alternative methods with which to achieve the results required,
- d) select the best alternative method, and
- e) develop the selected alternative method into supporting tasks.

5.5.2.2 For each supporting task:

- a) determine the results required,
- b) formulate the objective,
- c) determine the best method with which to achieve the results required, and
- d) develop the method into controlling tasks.

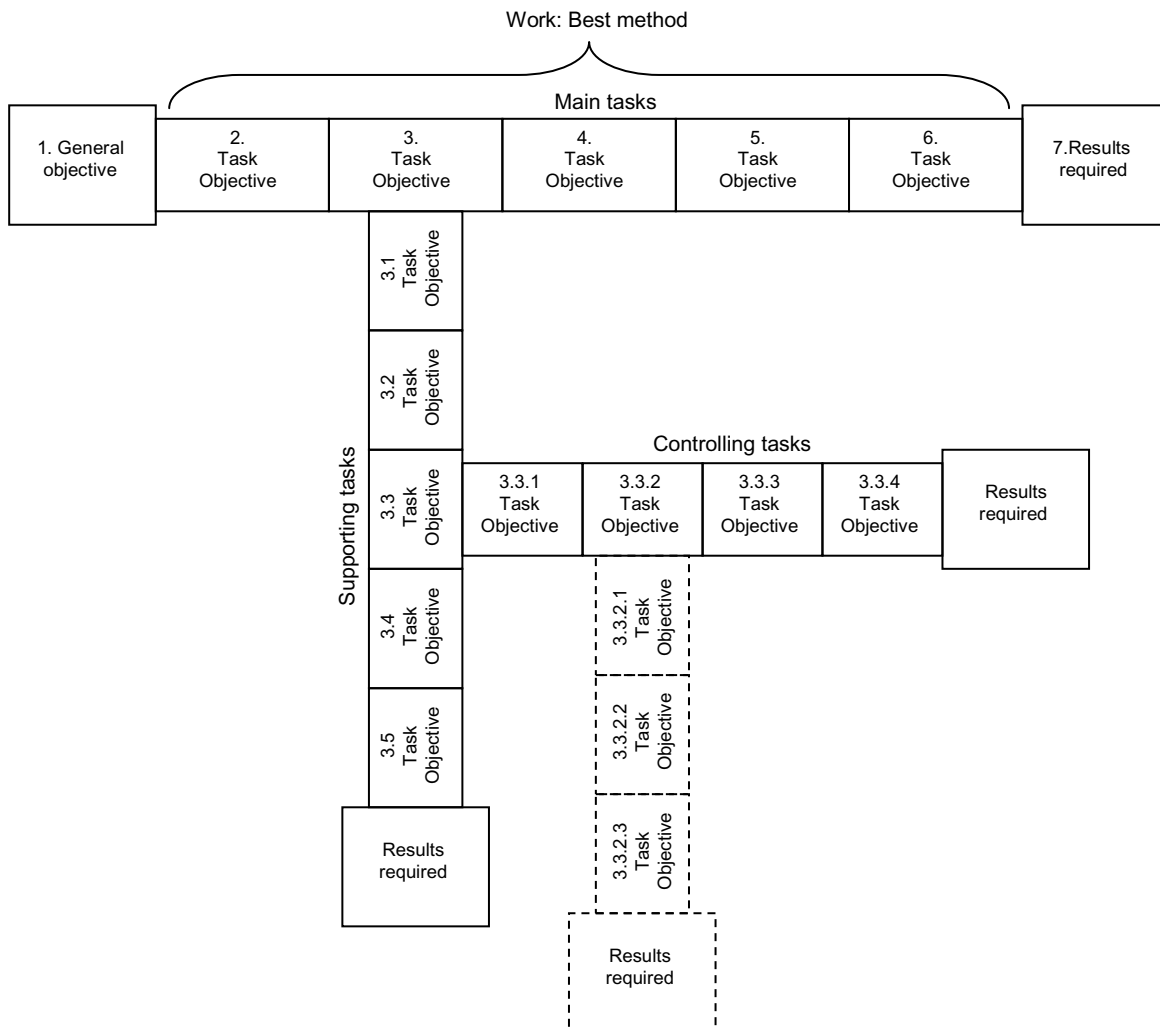


Figure 5.14: Development of the work flow

5.5.2.3 For each controlling task:

- a) determine the results required,
- b) formulate the objective,

- c) determine the best method with which to achieve the results required, and
- d) develop the best method into tasks and where necessary develop these tasks further down to the most elementary and smallest tasks required.

The sequence outlined above would ensure that:

- starting with the results required the work flow is developed systematically,
- work for each task would support a common objective,
- objectives ultimately would culminate into the general objective and results of the supervisor, department and the organisation as a whole,
- objectives are optimally aligned,
- work would be scientifically developed, integrated, coordinated and delegated, and
- required resources could be accurately established.

For the supervisory positions it would be sufficient to develop the work flow only down to the controlling tasks. The reasoning behind this statement is that the:

- main tasks represent the selected perceived best method in order to achieve the required results most efficiently,
- supporting tasks are necessary to ensure that each main task is being performed efficiently,
- controlling tasks ensure that adequate control is exercised for the efficient execution of the supporting tasks and that the optimum results are achieved through the execution of the main task, and
- supervisor could efficiently delegate work and accountabilities to the specific subordinates.

The extension of the work flow, indicated by the dotted lines in figure 5.14, suggests that in the situation where required the work flow must be developed further (refer section 5.5.2.3 (d)). It must be developed until full control is established for that specific post or at the lowest levels to continue the work flow to the smallest task component necessary and to perform the task and resources analysis in the required detail. Once this is completed the task and resources analysis must be summarised from the bottom upwards and grouped into posts, sections and departments.

### **5.5.3 Development of the work flow of the comprehensive management method**

The management work to manage would be systematically developed in this section by applying the comprehensive management theory (refer section 5.4.2 and 5.4.3 and figure 5.9, 5.10, 5.13 and 5.14). The classification of management work should follow logically from the work flow development diagram (refer figure 5.15, 5.15 (a i), 5.15 a (ii), 5.15 (b), 5.15 (c), 5.15 (d) and table 5.2). The work flow of management work in figures 5.15 to 5.15 (d) is proposed as a general approach to develop and analyse management work. It could vary with the strategy, type of business, specific discipline, reasoning capability of personnel and discipline control. The steps as outlined in section 5.4.4 and 5.5 should be followed (refer figure 5.14).

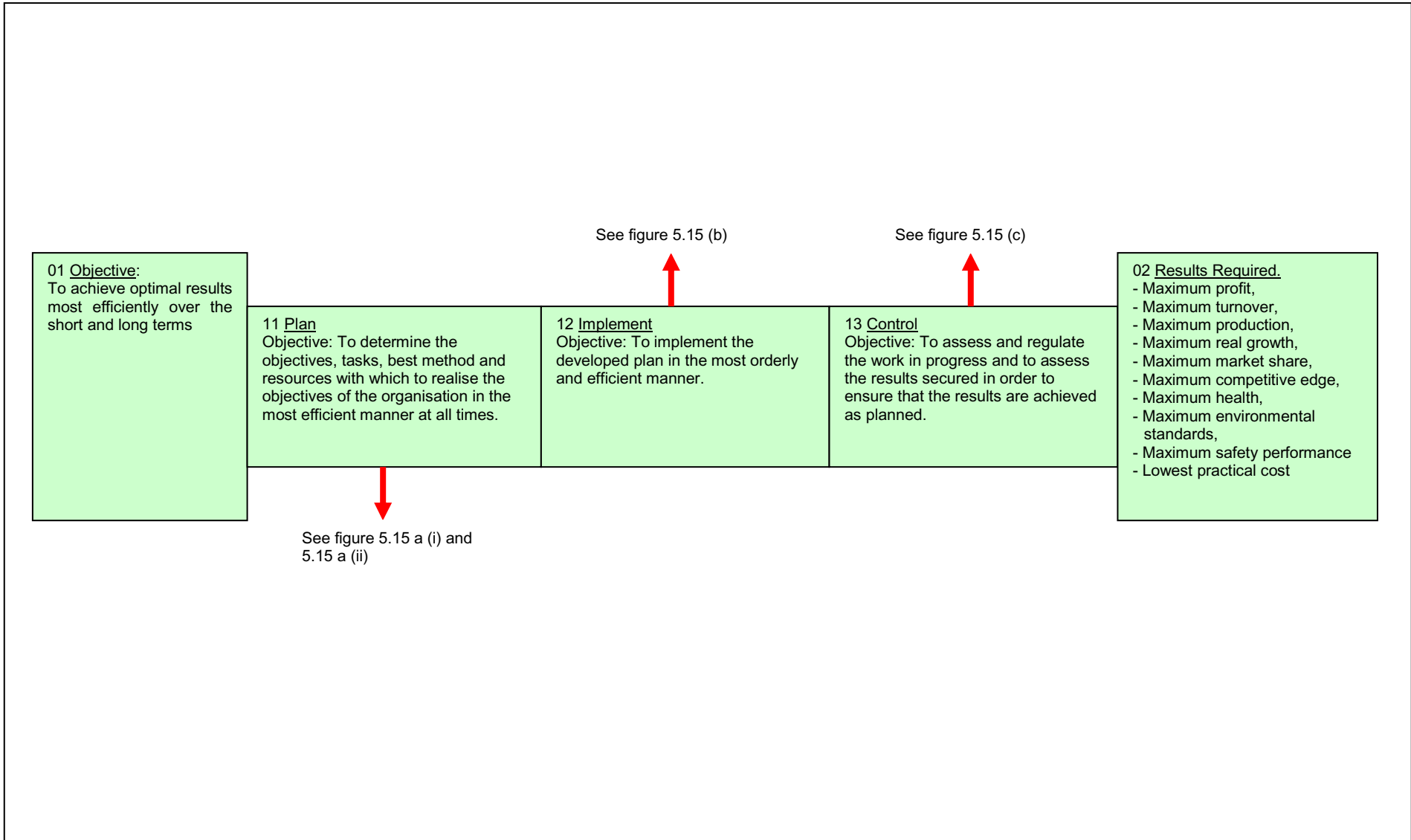


Figure 5.15: Detail work flow development of the alternative to manage with the comprehensive management logic

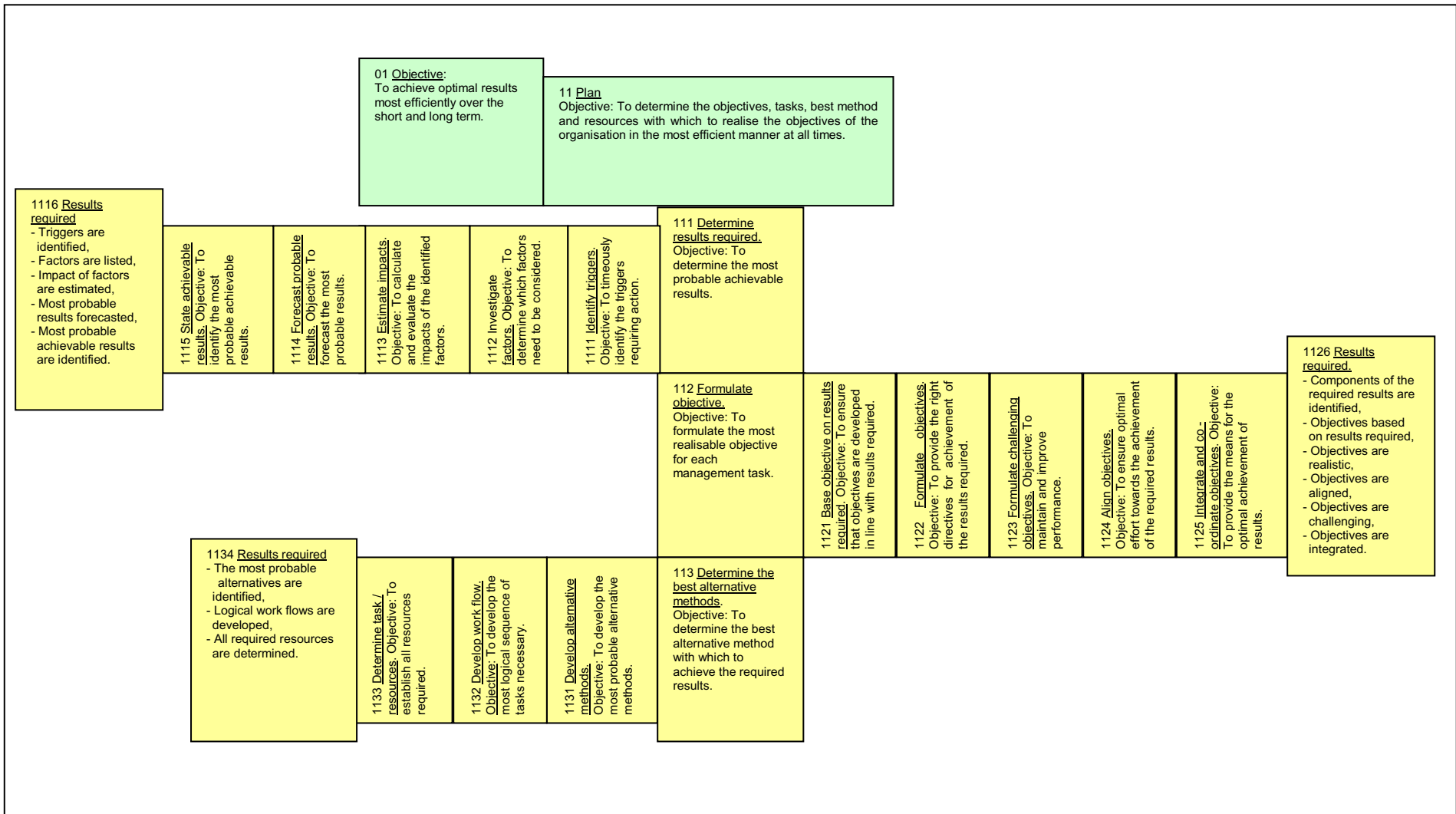


Figure 5.15 (a i): Detail work flow development of the main task to plan with the comprehensive management logic

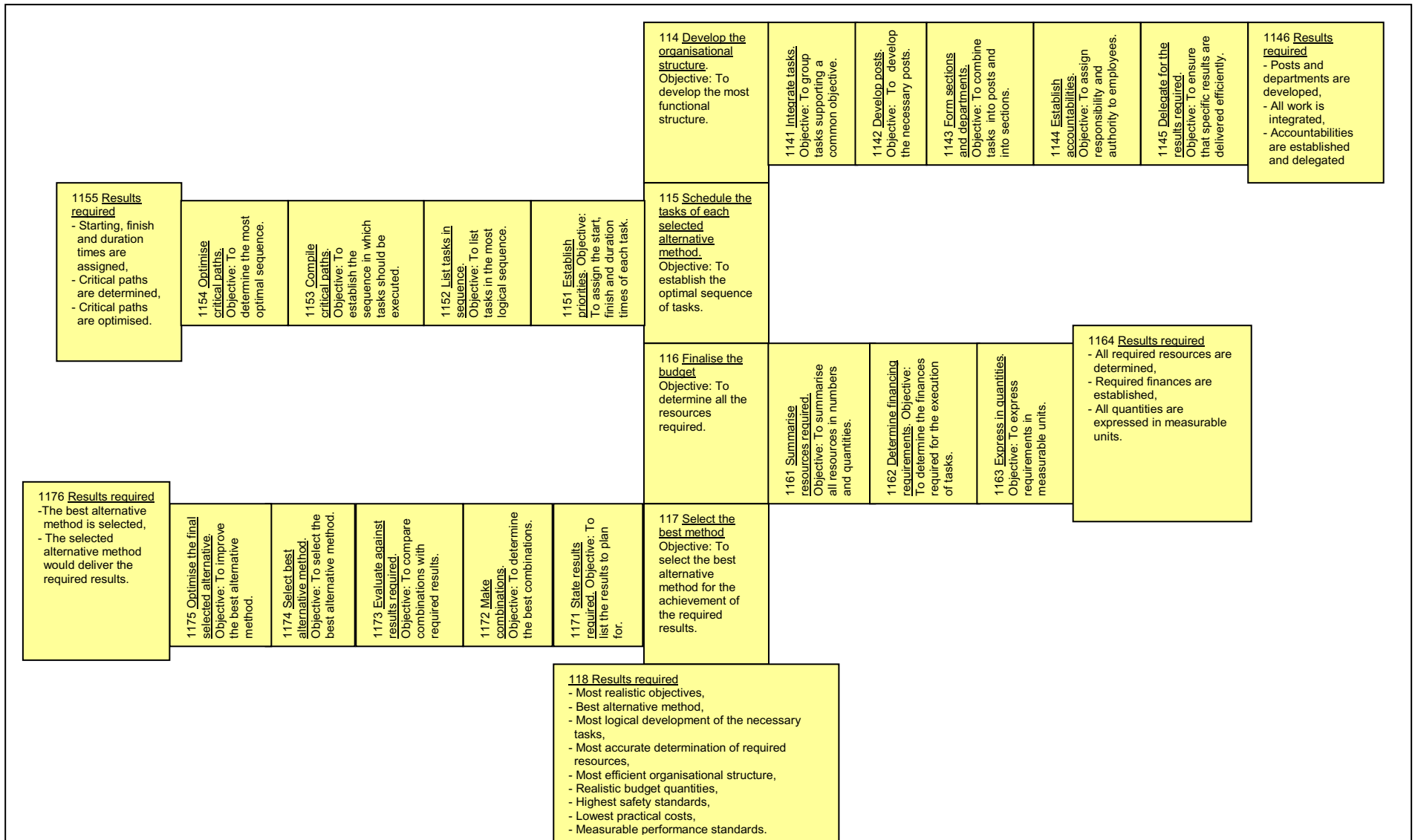


Figure 5.15 (a ii): Detail work flow development of the main task to plan with the comprehensive management logic



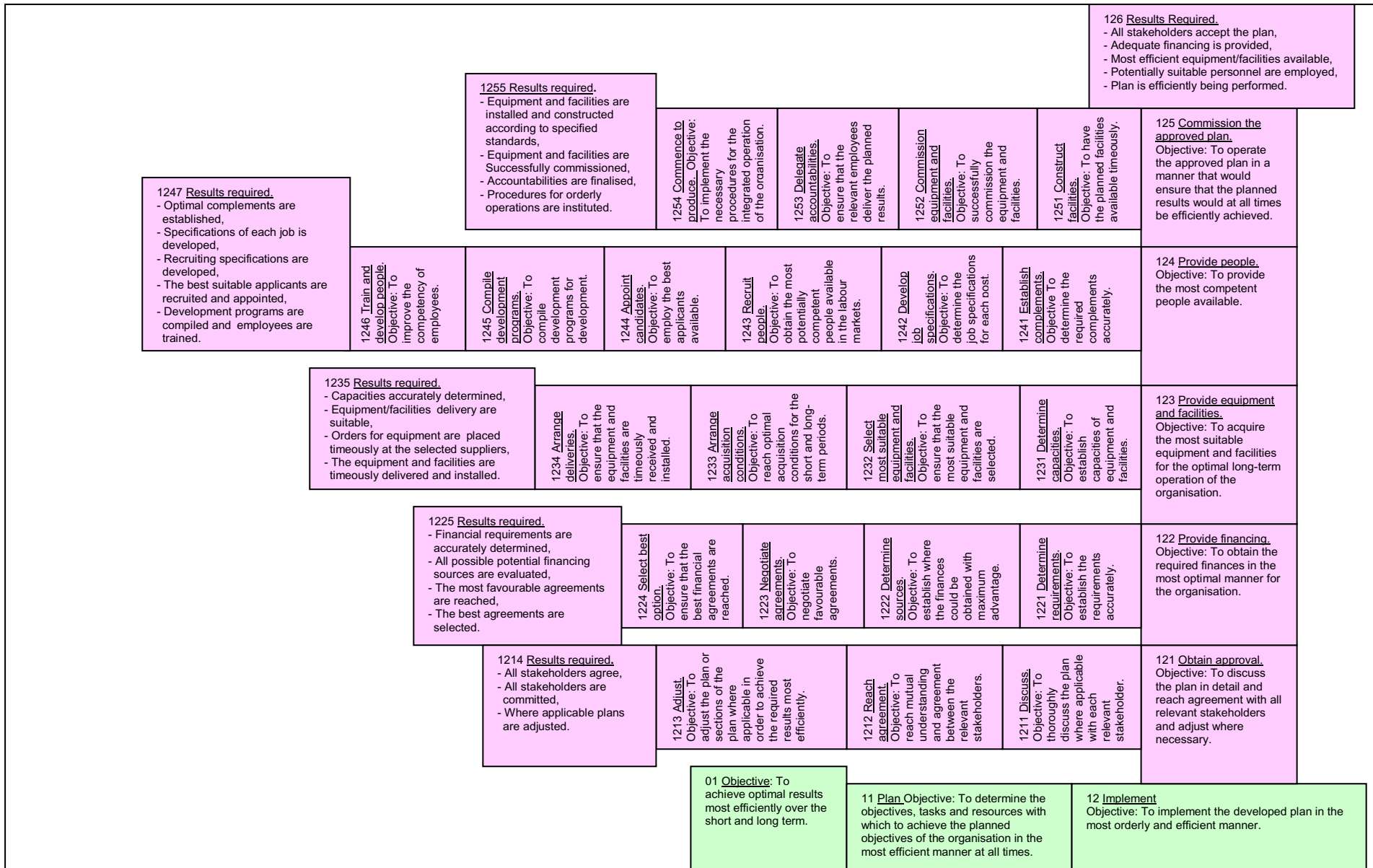


Figure 5.15 (b): Detail work flow development of the main task to implement with the comprehensive management logic

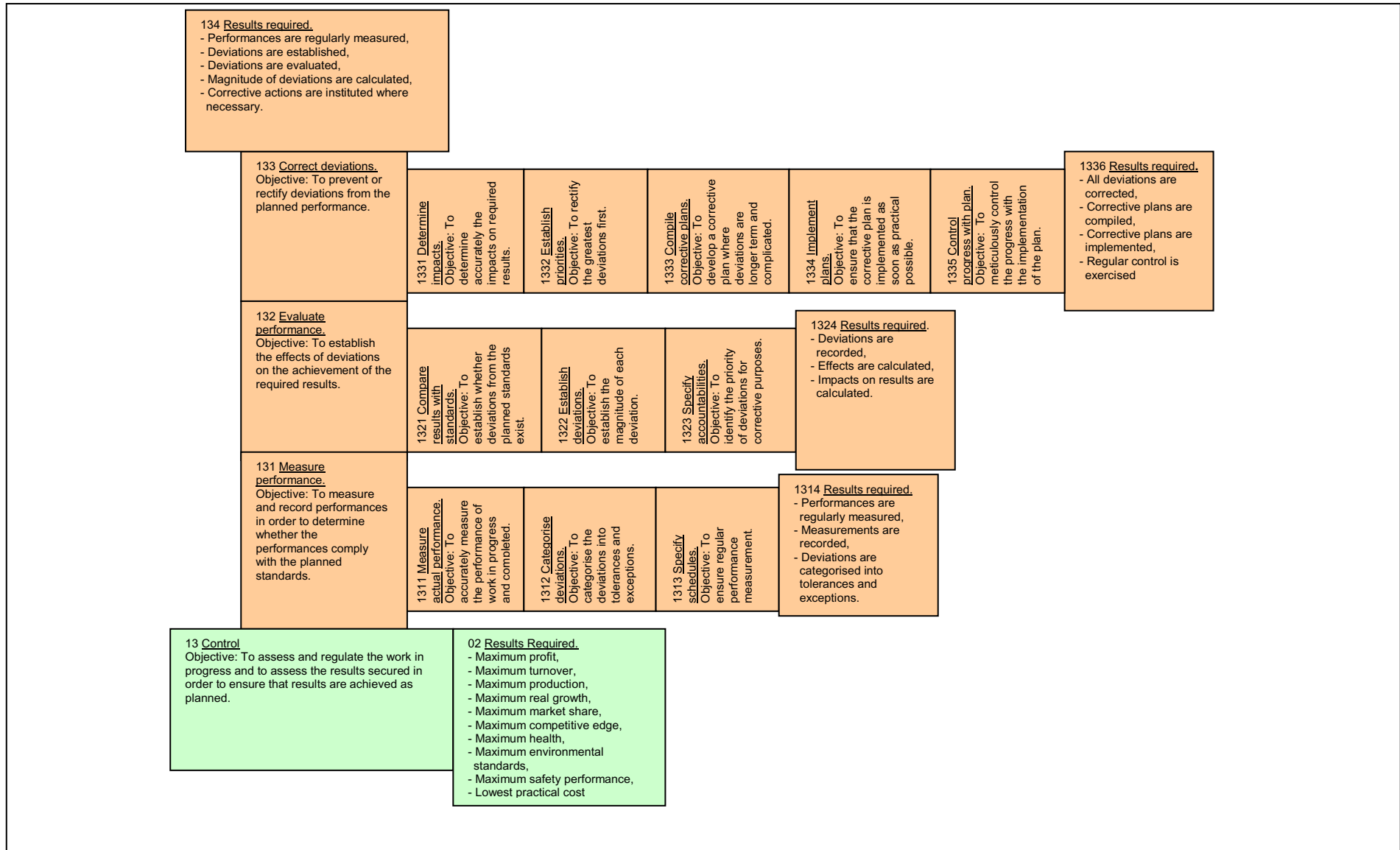


Figure 5.15 (c): Detail work flow development of the main task to control with the comprehensive management logic

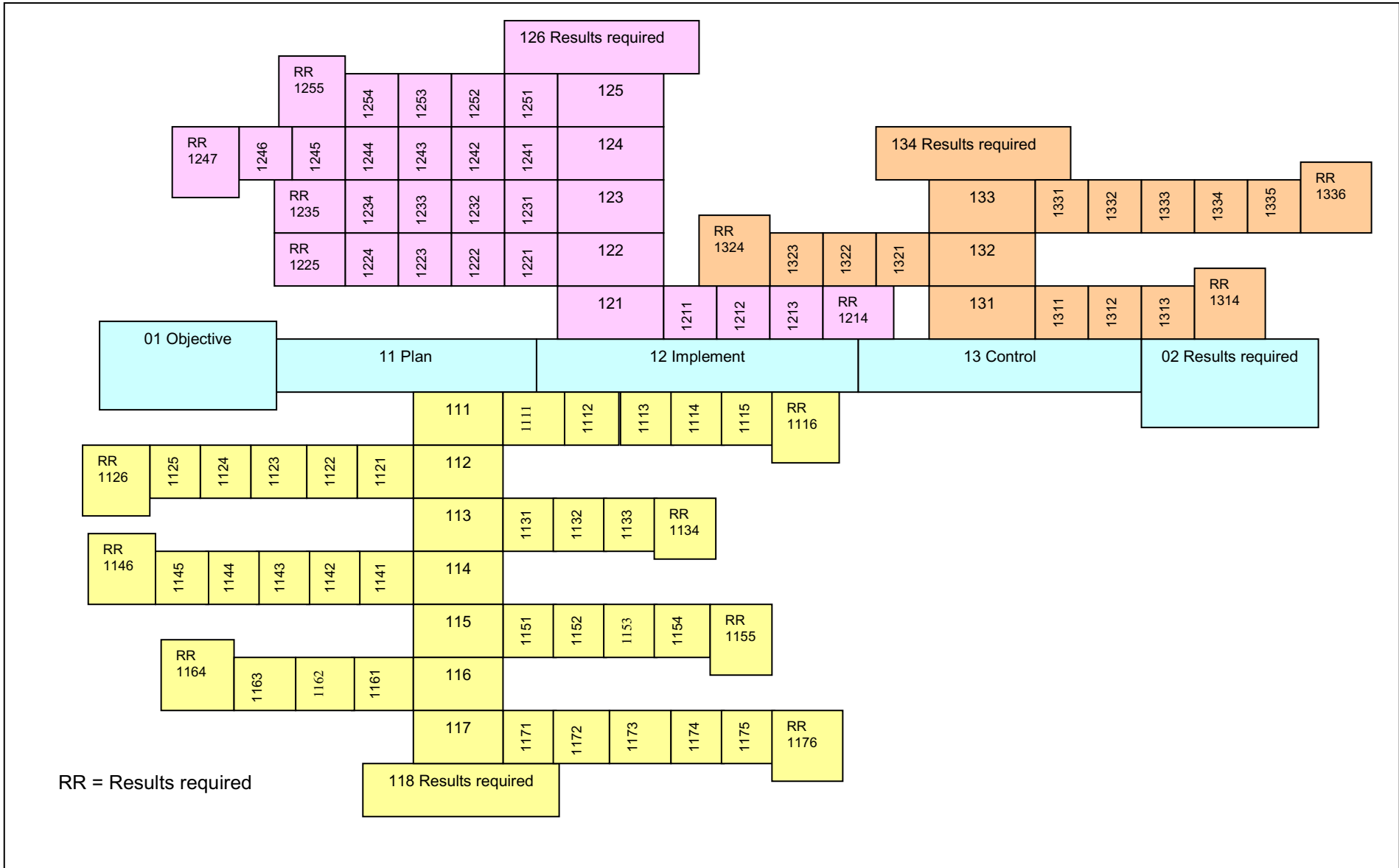


Figure 5.15 (d): Work flow development of the comprehensive management logic

In order to correctly implement the comprehensive management logic the employee should at all times endeavour to:

- develop the work (method) into the minimum logical number of necessary tasks,
- include all the necessary work in the subsequent development steps,
- develop the controlling tasks further where required (refer figure 5.14 ), and
- ensure that the process down to the last task is logical and supportive of the objective

Due to space limitations the development of the work flow for the management work to manage was demonstrated in six sections:

- one diagram on the main tasks of the alternative to manage (refer figure 5.15),
- two diagrams on the planning main task (refer figure 5.15 (a i) and 5.15 (a ii)),
- one diagram on the management work to implement (refer figure 5.15 (b)),
- one diagram on the management work to control (refer figure 5.15 (c)), and
- a general key plan/diagram of the whole flow diagram (refer figure 5.15 (d)).

From the logic it could be stated that:

- the main results required must satisfy the main objective,
- the results required for each main task must satisfy the objective of each main task and would become the standards of performance, and
- the results of all the main tasks must add up to the main results required for the general objective. It must be the total of the results required from each main task. For example the unit cost of production for the company would be the total unit costs of the main tasks.

The systematic and logical development would:

- facilitate the classification of management work,
- facilitate the development of a logical planning process,
- facilitate the development of a logical planning structure,
- establish the logical application of management principles, and
- ensure efficient delegation.

#### **5.5.4 The comprehensive management classification**

Classification of management is necessary in order to develop and practically apply management work. It would follow logically from the development of the comprehensive management logic work. The work flow of management work is proposed as a general approach to develop and analyse management work (refer figure 5.15 to 5.15 (c) and table 5.2). It could vary with:

- strategy,
- type of business,
- specific discipline, and
- reasoning capabilities of personnel.



Main tasks	Supporting tasks	Controlling tasks
Plan	- Determine the results required	<ul style="list-style-type: none"> <li>- Identify the relevant deviations or triggers</li> <li>- Investigate and analyse the factors involved</li> <li>- Estimate the impact of these factors</li> <li>- Determine and forecast the most probable results</li> <li>- Discuss and state the most probable achievable results</li> </ul>
	- Formulate the objective	<ul style="list-style-type: none"> <li>- Base the objective on the results required</li> <li>- Formulate objectives in futuristic terms (start with "To")</li> <li>- Formulate challenging objectives</li> <li>- Align objectives</li> <li>- Integrate and coordinate objectives</li> </ul>
	- Determine the best alternative methods	<ul style="list-style-type: none"> <li>- Develop alternative methods</li> <li>- Develop the work flow for each selected alternative method</li> <li>- Develop the task and resources analysis for each selected alternative method</li> </ul>
	- Develop the organisational structure	<ul style="list-style-type: none"> <li>- Integrate the tasks supporting a single objective</li> <li>- Develop the required posts</li> <li>- Form sections and departments</li> <li>- Establish accountabilities</li> <li>- Delegate for the achievement of the required results</li> </ul>
	- Schedule the tasks of each selected alternative	<ul style="list-style-type: none"> <li>- Establish priorities</li> <li>- List tasks in sequence</li> <li>- Compile critical paths</li> <li>- Optimise critical paths</li> </ul>
	- Finalise the budget	<ul style="list-style-type: none"> <li>- Summarise the resources required</li> <li>- Determine financing requirements</li> <li>- Express requirements in measurable quantities</li> </ul>
	- Select the best alternative method	<ul style="list-style-type: none"> <li>- State the results required</li> <li>- Make combinations where applicable</li> <li>- Evaluate each against the results required</li> <li>- Select the best alternative method</li> <li>- Optimise the selected alternative method</li> </ul>
Implement	- Obtain approval for the plan	<ul style="list-style-type: none"> <li>- Discuss plan with stakeholders</li> <li>- Reach agreement</li> <li>- Adjust plan where necessary</li> </ul>
	- Provide financing	<ul style="list-style-type: none"> <li>- Determine the requirements</li> <li>- Determine potential financing sources</li> <li>- Negotiate acquisition agreements</li> <li>- Select the best option</li> </ul>
	- Provide equipment and facilities	<ul style="list-style-type: none"> <li>- Determine capacities</li> <li>- Select the most suitable equipment and facilities</li> <li>- Arrange acquisition conditions</li> <li>- Arrange deliveries</li> </ul>
	- Provide people	<ul style="list-style-type: none"> <li>- Establish complements</li> <li>- Develop job specifications</li> <li>- Recruit people</li> <li>- Appoint the most suitable applicants</li> </ul>



		<ul style="list-style-type: none"> <li>- Compile development programs</li> <li>- Train and develop people</li> </ul>
	-Commission the approved plan	<ul style="list-style-type: none"> <li>- Construct facilities</li> <li>- Commission the equipment and facilities</li> <li>- Delegate accountabilities</li> <li>- Commence to produce the results planned</li> </ul>
Control	- Measure performance	<ul style="list-style-type: none"> <li>- Measure actual performance</li> <li>- Categorise deviations</li> <li>- Specify schedules</li> </ul>
	- Evaluate performance	<ul style="list-style-type: none"> <li>- Compare results with standards</li> <li>- Establish magnitude of deviations</li> <li>- Specify accountabilities</li> </ul>
	- Correct deviations	<ul style="list-style-type: none"> <li>- Determine impact of each deviation</li> <li>- Establish priorities</li> <li>- Compile corrective plans</li> <li>- Implement the plans</li> <li>- Control progress with plans</li> </ul>

**Table 5.2: Classification of the comprehensive management work**

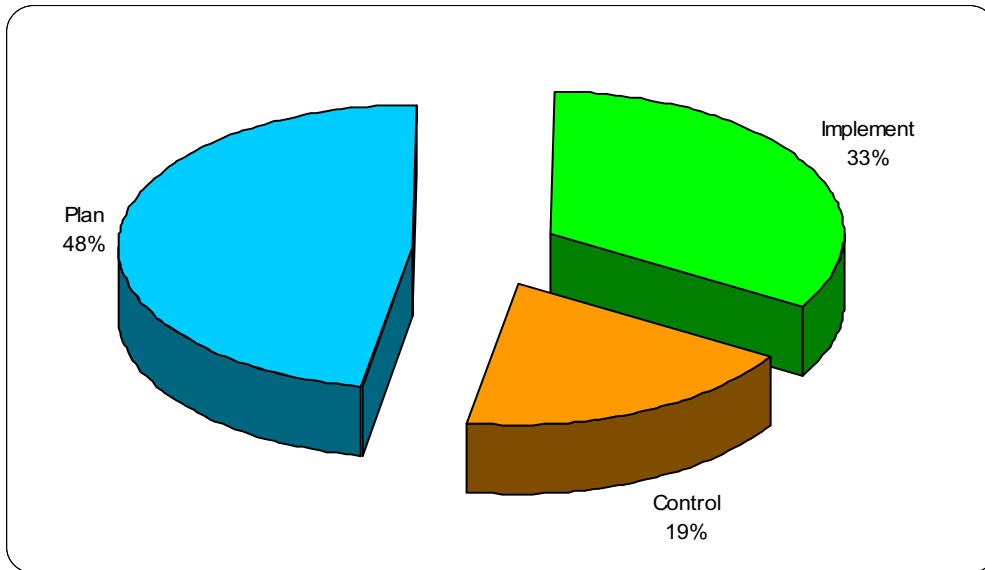
From table 5.2 it was clear that:

- all the activities of the organising function of the administrative management approach are part of the main management task to plan. It is therefore more correct to perform this work during the planning stage. It would automatically result in the logical integration of the required management work,
- the activities of the leading function are utilised in management to maintain the tasks to plan, to implement and to control. They should be seen as management skills that should be utilised from the start to the end and during management work when and where required. It should not be seen as structural components or building blocks of the management structure but rather as the ‘tools’ to drive the management process, and
- the supporting task to develop performance standards is performed as part of the main task to plan.

The management discipline, similar to other scientific disciplines, would now fully comply with the requirements of a universal scientific developed norm of analysis. It is also a science and a profession (refer section 2.4.10).

### **5.5.5 The relative importance of the main tasks of the comprehensive management work**

The relative importance of each of the three main management tasks of the comprehensive management work was established from the classification of management (refer section 5.5.4 and table 5.2). The relative importance of the management work to plan is confirmed by the analysis and classification of the comprehensive management method. From this classification it would appear that the main management task to plan is the most important component of management work (refer section 2.6.2.1). It represents 48 per cent of the total management work (refer figure 5.16 and table 5.2).



**Figure 5.16: Relative composition of the main tasks of the comprehensive management logic**

## 5.6 PROPOSED MANAGEMENT PLANNING STRUCTURE FOR THE MINING INDUSTRY

### 5.6.1 The planning process

The South African mining industry was from its inception extremely capital intensive. Mines are normally planned over relative long periods in order to justify the capital expenditure and remuneration to the shareholders for their investments. The planning process should accommodate these needs.

An efficient planning process should enable management to:

- 5.6.1.1 determine the required results
- 5.6.1.2 provide the direction and purpose for the company,
- 5.6.1.3 determine the best method with which to realise the objectives,
- 5.6.1.4 determine the necessary performance standards,
- 5.6.1.5 coordinate and integrate all work,
- 5.6.1.6 establish control and corrective measures,
- 5.6.1.7 delegate work efficiently,
- 5.6.1.8 reveal future opportunities,
- 5.6.1.9 identify all risks and threats,
- 5.6.1.10 efficiently accommodate any foreseen and unforeseen changes and risks, and
- 5.6.2.11 optimise the resources and performance of the organisation.

The planning process would follow logically from the development and classification of the comprehensive management work (refer section 5.5.4, figure 5.15 to 5.15 (d) and table 5.2). The process closely follows the sequence of the development of the supporting and controlling tasks of the management main task to plan and to implement the plan. From figure 5.17 it is clear that the





(refer section 2.6.2.1, 5.6.1 and figure 5.17). It is imperative that each manager should compile his own plan, only utilising functional or staff departments, where really justified.

The planning framework or structure should facilitate the:

- optimal realisation of objectives,
- logical development of management work,
- optimisation of resources,
- optimal integration, and
- coordination and control of all the tasks of each employee on each level of the organisation.

The following practical and logical planning structure for the South African mining industry is proposed. Each mining house should decide whether to implement or reject it as proposed or to amend it for its own specific situation.

#### **5.6.2.1 The strategic plan**

The strategic management process commences when the executive team evaluate their current situation in view of the vision, mission, objectives and existing strategy (Daft, 1995 183). The strategic plan should be realistic, practical, general and aim to ensure that it realises its stated general objective with the selected method despite changing circumstances (refer figure 5.15 to 5.15 (d)). It should be developed in such a form as to guide the necessary managerial decisions and actions (Ansoff, 1968:101). The strategic plan has mainly to do with the main business of the mining company. In some cases, it could also be applicable to the mines, departments or sections.

The strategic plan should:

- a) be initiated by the chief executive officer of the organisation and his immediate subordinates
- b) be compiled in broad terms,
- c) include any policies relevant to the plan,
- d) state the vision or general objective of the organisation,
- e) state and describe the mission or best method with which to realise the general objective,
- f) specify the strategic resources required,
- g) be periodically compiled when changes in legislation, resources, threats, strengths, weaknesses, opportunities and risks occur,
- h) be maintained and regulated continuously for the effects of any changes, and
- i) be adjusted or totally recompiled when changes justify an adjustment or a new strategy.

#### **5.6.2.2 The long-term plan**

Mining is a long-term venture, normally from 20 up to 100 years and more. It requires huge capital investments and infrastructure. It would therefore be imperative to plan for vital resources such reserves, capital, labour and rehabilitation over long periods. It is also extremely important to plan for, opportunities, challenges and risks over an extended period. These resources, by its very

nature, are not short term. The long-term plan should be compiled for the mining house and the life duration of each mine.

It should:

- a) be compiled within the framework of the strategic plan,
- b) be compiled for the life of the mine,
- c) specify the general objective of the mining house, mine or department,
- d) be aimed at the realisation of the general objective of the mining house and mine,
- e) specify the best method with which to realise the general objective,
- f) develop the main, supporting and controlling tasks,
- g) establish the main resources required, and
- h) be utilised mainly by top management of the mining house and mine.

### **5.6.2.3 The medium-term plan**

Whereas the long term plan should be compiled very broadly the medium term plan should be compiled in much more detail. It should cover a maximum period of up to five years.

It should:

- a) look in more detail into the allocation and development of resources and achievement of results for the first few years of the long-term plan,
- b) ensure that the development and management of vital resources such as labour, reserves, and capital, are adequately planned for and controlled, and
- c) ensure that in the event of unforeseen detrimental factors timeous action should be taken.

### **5.6.2.4 The short-term plan**

The short-term plan should:

- a) cover the first year of the medium-term plan in as much detail as is practically feasible,
- b) plan for every type of resource (labour, equipment, material, stores etc) in detail,
- c) provide the performance standards for control,
- d) enable management to accurately determine the efficiency of output, and
- e) facilitate the measurement of work completed and in progress so that timeous corrective actions could be planned for and instituted.

### **5.6.2.5 Operational plans**

An industry such as mining needs to set targets or 'calls' on an hourly or per shift basis. Due to the difference in shift lengths and the possibility of varying number of shifts per week and month it is essential to ensure that the hourly targets are being realistically planned and achieved in order to ensure the efficient achievement of the daily, monthly and annual results.

The results required must be set for each employee on each level in the organisation in understandable and measurable units or standards. The continuous miner operator for example would not necessarily have a clear perception of tonnage. The meters cut or the shuttle cars loaded per shift or even better per hour would be a much more practical control standard. The roof bolt operator would find it extremely difficult if not impossible to effectively comply with a performance standard such as tons per roof bolt. The distance between the rows of roof bolts and the number of roof bolts per row would be easily measurable and would ensure more efficient compliance, control and safety. He would now be fully empowered to efficiently measure, evaluate and control the compliance with the prescribed standards.

Operational plans should:

- a) be compiled by every employee,
- b) be compiled for each month of the short-term plan in the greatest detail practically feasible,
- c) be adjusted whenever required,
- d) be compiled for measurable periods such as per hour, shift, day, week and per month,
- e) plan for every resource (labour, material, stores, risks, etc),
- f) provide easily understandable and measurable performance standards for control, and
- g) facilitate the measurement of work completed and in progress so that timeous corrective action could be planned for and instituted.

#### **5.6.2.6 Corrective action plans**

A corrective action plan is a predetermined course of action to rectify deviations, eliminate or manage threats, optimise opportunities within a definite time period or to prevent catastrophes. In mining operations deviations from plans would basically occur on a regular basis. A sound approach therefore would be to plan for the means to timeously detect and correct these deviations if planned results are to be achieved.

The reporting mechanisms developed during planning by the departments and sections within the mining company must be developed to timeously identify the areas where current performance is not meeting planned performance standards. Priorities for action to correct these deviations or to take advantage of opportunities must be determined. Every employee should identify and correct any deviation in his area of accountability.

#### **5.6.2.7 Contingency plans**

Contingency plans are intended to minimise the negative effects of possible unexpected changes and occurrences. The mechanisms to timeously identify and report contingencies should be part of the planning and reporting systems. With the development of the task and resources analysis the identification of possible deviations are identified as part of the planning process. Preventative measures and procedures to manage it could then be compiled before deviations actually do occur.

### **5.6.2.8 Supporting plans**

Supporting plans are plans that support the efficient realisation of the mine's objectives. This should include:

- a) plans to manage risks where necessary,
- b) plans to institute preventative measures,
- c) plans to support training schedules, and
- d) any other plan, however small, intended to keep the mine, department, section or individual employee on track towards the optimum realisation of the planned objectives.

Most of these plans could be identified during the planning process with the development of the task and resources analysis. Preventative action or procedures could then be developed and instituted for each task and responsibility.

### **5.6.2.9 Project plans**

Project plans entail the planning and implementation of specific identified ventures to improve performance results, rectify deviations or initiate the more profitable utilisation of resources. Project plans could range in magnitude from a relatively insignificant amount of capital to billions of rand depending on the intention or nature of the project. The economical advantages to change from one type of support material or system to another would normally be handled and labelled as a project at moderate capital cost whilst the exploration and establishment of a complete multi-million rand mining venture may also be accorded with the same humble semantics.

### **5.6.2.10 Fixed plans**

Policies, procedures, rules and regulations are all forms of plans but are also factors that influence, limit or facilitate the achievement of planned results. A mine has a need for planning to cater for repetitive types of problems and to ensure a uniform method for greater efficiency. There are normally many different types of fixed plans. The most common fixed plans in the South African mining industry are policies, procedures, rules and regulations and emergency plans. Each would be briefly discussed in the following sections.

#### **a) Policies**

Policies are broad guidelines issued by top-level management sometimes necessitated by external factors not necessarily directly related to the operations of the organisation. In the mining industry it is issued mainly by the head offices to govern main aspects such as safety, employment, training and development and compliance with statutory laws and regulations.

## **b) Procedures**

Procedures are uniform or standardised methods of performing identified repetitive and risk related work compiled company, departmental and sectional wide or for specific posts with the aim of ensuring that the most efficient methods for greater efficiency, safety, employment, remuneration, training and induction are applied.

Procedures also ensure that repetitive tasks would always be uniformly performed according to the approved method. It serves as valuable training and control material. The authorised roof bolt installation procedure on a colliery serves as a typical example.

## **c) Rules and instructions**

Lower level management normally issues rules and instructions. It is issued in conjunction with any legitimate aspect of the company or specific mine, department or section where the supervisor accountable, is convinced that it would be necessary in terms of productivity, safety, sound labour relations and the general image of the section and the company. A compulsory feedback meeting at the end of the shift to ensure that all equipment and material are parked and stored in the prescribed positions and places serves as a typical example.

## **d) Emergency plans**

Emergency plans are compiled to minimise the possible effects of an emergency should it occur. Typical plans in this category on a mine are those plans that for example make provision for:

- i) fire fighting,
- ii) hazards,
- iii) underground escape routes,
- iv) emergencies,
- v) main water supply, and
- vi) main power supplies.

### **5.6.2.11 Main advantage of the planning structure**

The main advantage of the planning structure, derived from the comprehensive management logic is that it would serve as a core management control system. It would direct the integrated action of all employees. According to Daft (1995:511) the core control system consists of all the different plans in the planning structure from the top to the bottom of the organisation, the control systems of the various departments, sections and the organisation as a whole. Any required change in any of the results could easily be accommodated throughout the entire organisation

## 5.7 CONCLUSION

The theory that would enable all employees, from the top to the lowest position, to manage their work efficiently was developed in this chapter (refer section 5.4.3, 5.6 and table 5.2). It differs significantly from the perceived requirements that were proposed in section 2.2.1. In the new management theory management is seen as work and is classified into main, supporting, controlling and up to terminal or end tasks. It is comprehensive, practical, integrated and coordinated. It commences at the top and goes down all the way to the last and smallest task elements and resources and again up to the highest level in the organisation where and when required.

The advantages of the new theory are that:

- it is derived from a practical logic,
- it is comprehensive, practical and integrated,
- it is possible to scientifically classify management work,
- it facilitates the development of a logical integrated management planning process,
- a practical planning structure for the South African mining industry follows logically from it (refer figure 5.17),
- the planning process is applicable to each plan whether small or large or long or short term,
- it can be applied on all levels of the organisation, and
- it recognises the reality of and the need for every employee to plan for his results.

For the efficient application of it by all employees it is imperative that it should be correctly applied at all times. The proposed planning structure would ensure the logical development; integration and coordination of plans and the optimisation of resources in the entire organisation from the top to the bottom (refer section 5.6.2)

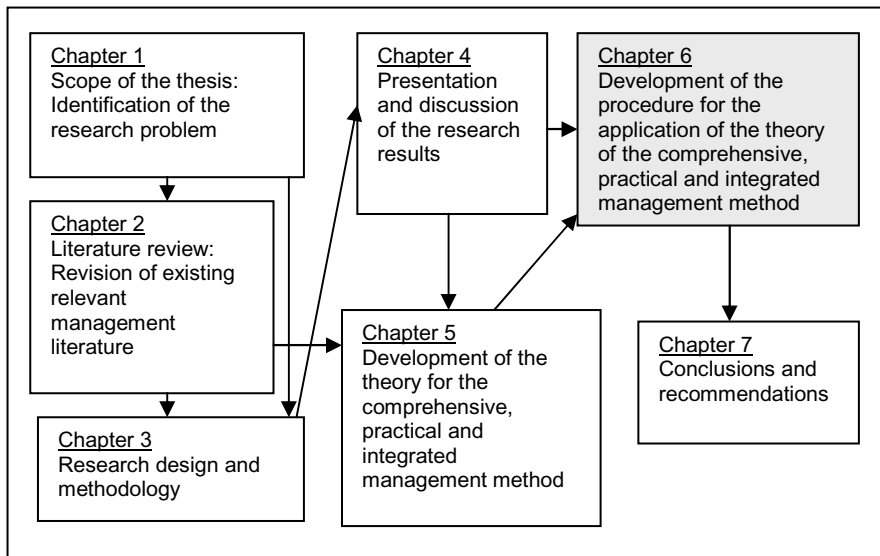
In the next chapter the procedure to apply the comprehensive, practical and integrated management theory in the practical situation would be developed and presented. Practical examples would be used as far as possible to demonstrate the application of the method.

## CHAPTER 6

# DEVELOPMENT OF THE PROCEDURE FOR THE APPLICATION OF THE THEORY OF THE COMPREHENSIVE, PRACTICAL AND INTEGRATED MANAGEMENT METHOD

### 6.1 INTRODUCTION

In the previous chapter the theory for the comprehensive, practical and integrated management method was developed (refer section 5.4). A logical integrated planning process and a planning structure for the South African mining industry were developed from the new theory (refer section 1.5.2.3, 1.5.2.8, 1.7.2.4, 1.7.2.8 and 5.6). Throughout this thesis the prerequisite was that the theory must be completely understandable and applicable in practice by every employee on all the levels of the organisation. The author is of the opinion that all employees on all the levels of the South African mining industry would understand and be able to apply the theory presented in chapter 5. It is imperative that the theory should be, meticulously, systematically and correctly applied.



**Figure 6.1: Chapter 6 in context to the overall thesis**

In chapter 1 it was hypothesised that a procedure to implement the developed comprehensive, practical and integrated management theory could be developed (refer section 1.5.2.8). It was also perceived that this procedure would be sufficient to enable management to successfully implement the developed theory in the South African mining industry on all the levels of the organisation (refer section 1.5.2.9). The objective with this chapter is to develop the procedure for the application of the proposed comprehensive, practical and integrated management theory and to evaluate it against the requirements and classification of the comprehensive, practical and integrated management method (refer section 5.4, 5.5 and table 5.2).

## 6.2 DEVELOPMENT OF THE IMPLEMENTATION PROCEDURE FOR THE COMPREHENSIVE MANAGEMENT THEORY

It was established in chapter 4 that 96.34 per cent of the mining organisations in South Africa utilised the process or administrative management approach (refer section 2.5.1.1 (d) and 4.3.2). Today the vast majority of management thinkers, supports the administrative management approach and accepts the classification of management work into the four functions of planning, organising, leading and controlling as the most representative approach of the management discipline (refer section 2.6.1). In chapter 2 it was concluded that this management approach lacks the theory to support a comprehensive, practical and integrated management method fully (refer section 2.2.1, 2.8.1, 2.8.3 and 4.4.2). The industry generally does not follow a uniform standardised integrated planning process and hierarchy with the result that the most optimal plans were not necessarily compiled and the best results were not planned for (refer section 4.2.2.1 b).

In chapter 5 it was accepted and proved that management work is a logical natural process and consists of the main tasks of planning the results required, implementing the plan and controlling the management and technical work for the achievement of the required results of an organisation (refer section 5.5 and table 5.2)). This approach formed the basis for the classification of the theory for the comprehensive, practical and integrated management method (refer section 5.5.2, 5.5.3 and 5.5.4).

The supporting tasks proposed in section 5.5.4 were seen as the correct logical steps for an efficient planning process for the South African mining industry (refer table 5.2 and figure 5.17). It is imperative that all employees on all the levels of the organisation are trained to plan efficiently and compile the necessary plans when required. It is a fact that the results of the organisation are mainly being achieved on the ground level – on the shop floor level and in the production faces.

Drucker (1968:173) argued that the jobs of higher management are just the sum total of the jobs of the ground floor employees. This statement would be proved in the development of the procedure for the implementation of the comprehensive, practical and integrated management method (refer figure 6.4 (a) to 6.4 (f)).

In the ensuing sections of this chapter the comprehensive management theory, the classification of management work, the logical planning process and the proposed planning structure as discussed in chapter 5 would form the basis for the development of the implementation procedure for the theory of the comprehensive, practical and integrated management method (refer section 5.4, 5.5 and table 5.2). It would be imperative that the steps proposed are meticulously applied and adhered to by every employee in the organisation.

The following practical example was proposed to be utilised in order to demonstrate the development of the procedure for the application of the comprehensive, practical and integrated management theory. The steps identified and proposed in chapter 5 would be applied (refer sections 5.4, 5.5 and table 5.2).



A mine was recently awarded a contract to supply 5 million tons of coal per annum (mtpa) to a customer at a quality of not less than 22.5 Megajoule per kilogram (MJ/kg). The proposed unit cost of R75.18 per ton in real terms was accepted by the customer when the contract was awarded. It was agreed that the unit cost could mutually be adjusted annually with the prevailing rate of inflation. The tons are to be delivered on time safely with maximum efficiency and at legally approved environmental standards. The contractual period is 20 years. The mine is contractually obliged to supply 5 mtpa for an additional period of ten years should the customer require such an extension.

The mine is located approximately 100 kilometers (km) south of the city of Johannesburg and 40 km south–west of the present town of Witbank in the Mpumalanga Province of the Republic of South Africa. The coal seam is fairly flat and even. The mineable section of the seam is on average 3.6 meters thick with a specific gravity (sg) of 1.5. The mine is to be planned as a totally mechanised mine utilising mechanised continuous miners to produce the coal. The underground roadways are to be developed on an average of 6.5 meters wide and 3.6 meters high.

The tons are to be sourced from eight production sections on a double shift per day, 22 days per month basis. The line of command is similar to that depicted in the typical organisational structure for underground collieries in South Africa (refer figure 6.3). One production manager reports to the mine manager, two mine overseers to the production manager and two shift bosses per shift to each of the two mine overseers. One miner per shift is in charge of one production section shift and each section employs one continuous miner operator per shift. The production targets (results required) per period are depicted in table 6.1 below. For better control the target of the continuous miner operator is expressed in meters cut per shift (35 tons per linear metre).

Occupation	Results required (tons)			
	Per shift	per day	per month	per annum
Mine manager	10 080	20 160	443 520	5 322 240
Production manager	10 080	20 160	443 520	5 322 240
One Mine overseer	5 040	10 080	221 760	2 661 120
One Shift boss	2 520	2 520	5 5440	665 280
One Miner	1 260	1 260	27 720	332 640
One continuous miner operator	36 m	36 m	792 m	9 504 m

**Table 6.1: Production targets per occupation per time period**

### 6.2.1 Plan

The objective of planning is to determine the most probable achievable results, the formulation of the objectives of the organisation and the best method with which to realise the objectives. The supporting and controlling tasks as set out in table 5.2 would be used as guidelines to develop the planning procedure. In the practical situation the controlling tasks should, where necessary, further be developed (refer section 5.5.3 and figure 5.15, 5.15 (a i) and 5.15 (a ii)).

### 6.2.1.1 Determine the results required

An efficient method to determine the most probable achievable results for planning could not be ascertained from the existing literature. In the comprehensive, practical and integrated management theory the supporting task to determine the most probable achievable results consist of five controlling tasks, which should be meticulously adhered to in order to ensure that the best decision with regard to the required results for planning purposes is arrived at (refer table 5.2).

#### a) Identify the relevant deviations or triggers

The planning process is normally initiated by events, called triggers (refer figure 5.17). Triggers by definition are events that would result in the initiation, adjustment, change, rejection or revision of a plan. In the example above the trigger was an official invitation by the customer to tender for the delivery of 5 mtpa.

The most common types of deviations and triggers are:

- i) performances below or above the stated standards,
- ii) needs,
- iii) opportunities, strengths, threats and weaknesses,
- iv) routine actions,
- v) special requests,
- vi) challenges, and
- vii) initiatives.

Any one of these triggers, depending on its magnitude and importance, could set the initiation, compilation, adjustment or revision of a plan in motion. It could also result in the adjustment or total change in the future business strategy of the organisation. It is important to realise that triggers would always exist. The manager, supervisor or employee should, therefore, always be conscious of this fact and ensure that the necessary management controls are in place to timeously detect any significant trigger. A sound management practice is to adequately ensure that the best persons to act upon triggers should be able to timeously detect them. The worker busy producing the items should be the first to be able to react to a trigger applicable to his work results. Timeous identification of triggers would minimise losses, optimise returns and eliminate or minimise catastrophes. This management method would enable the employee to identify any deviation (refer section 2.2.1.1 (a), 5.4.3, 5.5.2, 5.5.4, figure 5.9, 5.10, 5.17 and table 5.2).

Methods to ensure that triggers are timeously identified and acted upon could vary from post to post, from department to department or mine to mine. The comprehensive management logic theory would enable all employees on all the levels of the organisation to institute the necessary means to enable them to be timeously 'informed' of triggers that would necessitate action.

Internal control reports must be developed with a view of timeously detecting triggers to indicate whether results are being achieved or not. Where significant triggers, based on predetermined criteria, do occur, they should be treated as factors, which could either be a threat to the achievement of the results or an opportunity for the improvement of the results.

Each employee, section, department and organisation should at all times have the management means to develop reporting systems in order to monitor the relevant internal and external factors. Mechanisms to timeously detect external and internal deviations, threats, opportunities, strengths and weaknesses must be the logical outflow of the management method.

In order to timeously identify triggers the employee should:

- use an appropriate management method that would facilitate the development of the required performance standards and the reporting systems,
- utilise existing plans,
- obtain the input of the relevant stakeholders,
- compile and scrutinise performance reports,
- perform personal observations,
- utilise company magazines,
- scrutinise external reports and relevant technical magazines,
- carry out investigations, and
- conduct relevant researches and surveys where and when necessary.

#### **b) Investigate and analyse the factors involved**

Once the trigger or triggers that warrant action had been identified, the responsible employee must investigate the conditions or situation. He must:

- i) identify the factors or reasons that resulted in the deviations or triggers,
- ii) determine the potential impacts of these factors on the planned results,
- iii) identify the most important factors,
- iv) establish the relationships and interactions between the important factors,
- v) calculate the impact of the factors on the results required, and
- vi) list the most important factors in order of priority.

The relationships between factors could also present specific opportunities. It is therefore important that the relationships and interactions be considered and where applicable hypotheses be compiled for further consideration and evaluation.

#### **c) Estimate the impacts of these factors**

At this stage the employee would have a list of the most important factors but not a final list yet. In order to ensure that the most relevant factors are identified, evaluated and selected the responsible employee should systematically evaluate these factors.

The employee should:

- i) for evaluation purposes state the decisive criteria such as costs, risks, safety implications etc.,
- ii) calculate the impacts of each relevant factor on the required results,
- iii) rank each factor in terms of the criteria, stated in i) above, and
- iv) select the final factor or factors.

#### **d) Determine and forecast the most probable results**

It is important that the employee should first investigate, evaluate and forecast the most probable results (refer section 2.2.1.1 (b), 5.4.1, 5.4.3, 5.5.2, figure 5.9, 5.10, 5.12, 5.13, 5.14, 5.15, 5.17 and table 5.2). The objective with forecasting is to establish the most probable achievable set of results that the individual or organisation should strive for. Taylor (2007:667) defined forecasting as a prediction of what would occur in the future.

Many management decisions are long-term decisions and therefore management has no other choice than to anticipate the future in order to realise the short and long-term objectives. In the example proposed the specific period was contractually 20 years with the possibility of an additional extension of 10 years.

Drucker (1968:113) argued that:

"Predictions concerning five, ten or fifteen years ahead are always 'guesses'. Still, there is a difference between an 'educated guess' and a 'hunch', between a guess that is based upon a rational appraisal of the range of possibilities and a guess that is simply a gamble."

Every employee, from the operator to the chief executive officer of the organisation, must perform the management work of forecasting on his own level. The information needs of each stakeholder in the specific situation must be satisfied. Without full involvement in the forecasting process the stakeholder would not be optimally informed, committed and motivated. He would most probably not plan adequately for the work required to ensure that the results required from him are achieved efficiently (Albers, 2005:93).

#### **e) Discuss and state the most probable achievable results**

For optimal results it is important that agreement on the most probable achievable results and the probability of success of achieving it be reached between all the relevant stakeholders in all the teams, sections, departments and the organisation as a whole (refer section 5.3.12.4 and figure 5.7). The selected results would form the basis for further planning for the specific employee, section, department or organisation. The most probable achievable results must, at this stage be specifically stated and qualified in the most exact terms possible (refer section 2.2.1.1 (c), 5.4.1, 5.4.3, 5.4.4, 5.5.2, figure 5.9, 5.10, 5.12, 5.13, 5.14, 5.15, 5.17 and table 5.2).

The responsible manager or employee must:

- i) compare the most probable results with the provisional results required,
- ii) discuss and reach mutual agreement with all stakeholders,
- iii) finalise and state the most probable achievable results,
- iv) ensure that the results required are expressed in measurable units as far as practical,
- v) set performance standards for each required result,
- vi) put the most probable achievable results in writing,
- vii) set time limits,
- viii) set tolerances,
- ix) specify exceptions,
- x) discuss in group meetings and where necessary adjust it, and
- xi) delegate for results required.

The steps above are necessary to ensure that all stakeholders are fully informed and involved in the determination of the results required from each of them. Only after the relevant stakeholders have made their respective inputs can the supervisor abandon, adjust or accept and state the most probable results which would then become the most probable achievable results that he would use to formulate his objective (refer figure 5.17).

The final agreed-upon results may differ from those originally required or forecasted. Once agreement has been reached between all stakeholders each employee must establish the necessary control measures applicable to his area of responsibility. Mutually agreed-upon most probable achievable results form the basis for effective planning, delegation and controlling. The objective is to ensure that the results that would make the greatest contribution to the performance of the employee, section, department and company are selected for planning. These results should be in line and complimentary to the final results required from the organisation.

The results required from the mine manager in the example can therefore be stated as follows:

- Quantity:  $\geq 5$  mtpa.
- Quality:  $\geq 22.5$  MJ/kg.
- Unit cost:  $\leq R75.18$ .
- Safety: Accidents: Nil.
- Environmental pollution: Nil.
- Health cases:  $< 5$  Cases per annum.

#### **6.2.1.2 Formulate the objective**

Objectives are the leading guides toward the achievement of the most probable achievable results agreed upon. Objectives must be seen as the end results that must be planned for and are the specific results to be achieved within a stated time frame (refer section 2.6.2.1 (d) (iii)). Each employee must define the objectives for the results required from him. Once the most probable achievable results had been established the objectives or guiding directives could be formulated

(refer section 2.2.1.1 (d), 5.4.3, 5.4.4, 5.5.2, 5.5.4, figure 5.9, 5.10, 5.12, 5.13, 5.14, 5.15 to 5.15 (d), 5.17 and table 5.2).

For the successful realisation of organisational objectives the individual employee must know and understand the objectives he has to realise and to what extent these objectives would contribute to the realisation of the greater objective of his supervisor and those of the other stakeholders (Fritz, 2001:5). All objectives must be formulated, integrated, coordinated downwards, horizontally, vertically and finally upwards and verified with all the stakeholders during the planning process (refer section 5.3.5 and figure 5.3 and 5.4).

The objective is normally formulated as a concise summary or definition of the results required. It is extremely important to ensure that the objective includes the main components of the results required so that it could, for the period involved, serve as a clear directive to achieve the results required. It is necessary that all objectives in a company are formulated in futuristic terms, support each other and in turn support the general objective of the company.

The alignment of objectives is therefore imperative. It would result in a strong 'management force' directed towards the most optimal realisation of the company objectives as is illustrated in figure 5.6, 5.7 and 5.8. For any progressive company to stay ahead of the competition it would be imperative to always formulate challenging objectives and integrate and coordinate these objectives.

Depending on the results required the objectives could either be specific or general. A clear distinction should at all times be made between these two types of objectives where necessary. The process to formulate objectives is discussed in more detail in the following sections.

#### **a) Base the objective on the results required**

The components of the required results must be utilised in order to guide the employee to formulate the objective correctly. The objective therefore would only consist of the components of the required results because they are already expressed in measurable units against which the performance would be measured (refer section 6.2.1.1 (e) (iv)).

#### **b) Formulate objectives in futuristic terms (start with "To")**

Because an objective is a guide to direct the employee in his effort to achieve the required results it must be stated as a target – something that should be realised in the future. The future or period could be minutes or years depending on the nature of the specific plan or components of the plan. Objectives would have to be formulated for each task.

The objective for the mine manager in the example stated in section 6.2.1.1 (e) could for instance be formulated as follows:

**To deliver the required quantity and quality of coal to the client timeously, economically and safely.**

In this example the components of the results required are identified. The objective is based on the results required and it is formulated in futuristic terms.

### **c) Formulate challenging objectives**

Many organisations resort to programs such as benchmarking, work breakdown structures, activity-based management and managing by objectives in order to improve their performance and competitive position (refer section, 2.5.2.3, 2.5.2.4 and 2.5.3.1). These management practices, however, only serve at the most a few of the management tasks and would therefore not solve the problem as a whole in the most efficient manner.

For real and lasting improvement and performance the challenge should be transferred to the employees. Challenging objectives, formulated by them, would be a continuing inspiration for them to improve their performance and ultimately that of the organisation as a whole (refer section 5.3.5 and figure 5.4).

Employees must be trained to:

- i) understand what objectives are,
- ii) correctly formulate their objectives,
- iii) identify the contribution their objectives will make to that of their supervisors, departments and the organisation as a whole,
- iv) take the interests of stakeholders into consideration when formulating objectives,
- v) always formulate challenging objectives,
- vi) align their objectives with that of their stakeholders, and
- vii) adjust objectives where and when necessary.

### **d) Align objectives**

Often companies neglect to ensure that objectives are aligned. This could easily happen between sections and departments. It could therefore happen that some objectives in one department, although formulated with the best intentions as challenges, are not necessarily integrating and supporting the objectives of another department and that of the company as a whole.

A typical example is the production and maintenance departments. The production department would, for understandable reasons, want to always have maximum use of the production equipment in order to deliver the maximum production. The maintenance department, on the other hand, would want to have the equipment for as long as possible to carry out maintenance in order to ensure they meet their availability objectives. Although the intentions of the two departments are, in terms of the objective to optimise the resources at their disposal, quite legitimate it could totally be counter

productive and in fact could be degrading the optimal achievement of the results required by the department and the organisation as a whole.

Objectives should, for optimal performance, always be fully aligned and optimised in sections, departments and organisations (refer section 5.3.12.4, 5.3.12.5, figures 5.6, 5.7 and 5.8). It is clear that the objectives of the individual workers should jointly culminate into the objective of the team. Not only the team objectives but also the objectives of all the stakeholders in the specific situation should jointly contribute towards the optimal realisation of the objective of the section. The objectives of the sections should in turn culminate into the objectives of the departments and again the objectives of the departments into the general objective of the organisation (refer figure 6.3).

### **e) Integrate and coordinate objectives**

Without the integration and coordination of the objectives within sections, departments and the organisation the company can not hope to perform competitively. It therefore becomes imperative that the individual workers, sections and departments should discuss their objectives and concerns that they may have with each other where applicable. Some of these concerns could be valid and should therefore be evaluated and utilised in order to formulate the most realistic objectives. The integration and coordination of tasks would be necessary on every level and post in the organisation. All employees should conscientiously apply it as part of their management work.

### **6.2.1.3 Determine the best method**

#### **a) Develop alternative methods**

Normally it would appear that there could be more than one feasible method with which to achieve the required results. Ultimately there should be only one best method with which to achieve the specific predetermined most probable achievable results. The most feasible methods must now be generated and evaluated. The objective is to develop the most efficient methods from which to select the one best method in order to achieve the optimal results (refer section 2.2.1.1 (e), 5.5.3, figure 5.15 to 5.15 (d), 5.17 and table 5.2).

The manager or employee must:

- i) state the most probable achievable results required in explicit terms (refer section 6.2.1.1 (e)),
- ii) formulate the objective (refer section 6.2.1.2),
- iii) develop alternative methods (refer section 2.2.1.1 (e)),
- iv) screen each alternative method in terms of strengths, weaknesses, opportunities and threats, and probable achievement of the results required such as profits, costs, safety, etc, and
- vi) select the three to five most 'promising' alternative methods.

At this stage there can normally be no final decision made as to which one of the initial selected alternative methods would result in the most optimal outcome. Each initial selected alternative



method needs to be developed in terms of costs, risks, available equipment and technical skills to name only a few. No intelligent decision or conclusion could be made before the work flow or logical sequence of the necessary tasks, the analysis of the tasks and the required resources, budget and scheduling of each alternative had been completed. Only then the bottom line quantities would become available and could the best method be selected (refer figure 5.10, 5.17, 6.4 (a) to 6.4 (f) and table 6.1 (a) to 6.2 (h)).

## **b) Develop the work flow for each selected alternative method**

The development of the work flow is defined as the determination of the logical sequence of the necessary tasks to be performed for each alternative method, the performance standards required for each task and the objectives for each task, in order to achieve the results required in the most efficient manner (refer section 2.2.1.1 (d), 2.2.1.1 (f), 2.2.1.1 (g), 5.5.3, figure 5.9, 5.10, 5.14, 5.15 to 5.15 (d) and table 5.2). Taylor, in effect, utilised this principle of developing each task into the smallest elements to analyse and evaluate the components of the tasks in order to develop the most efficient method (refer section 2.5.1.1 (b)).

The development of the work flow consists of the following three main steps:

- state the results required for each main task (refer section 6.2.1.1 (e)),
- formulate the objective (refer section 6.2.1.2), and
- break the alternative method down into supporting tasks (refer figure 5.14 and 6.2).

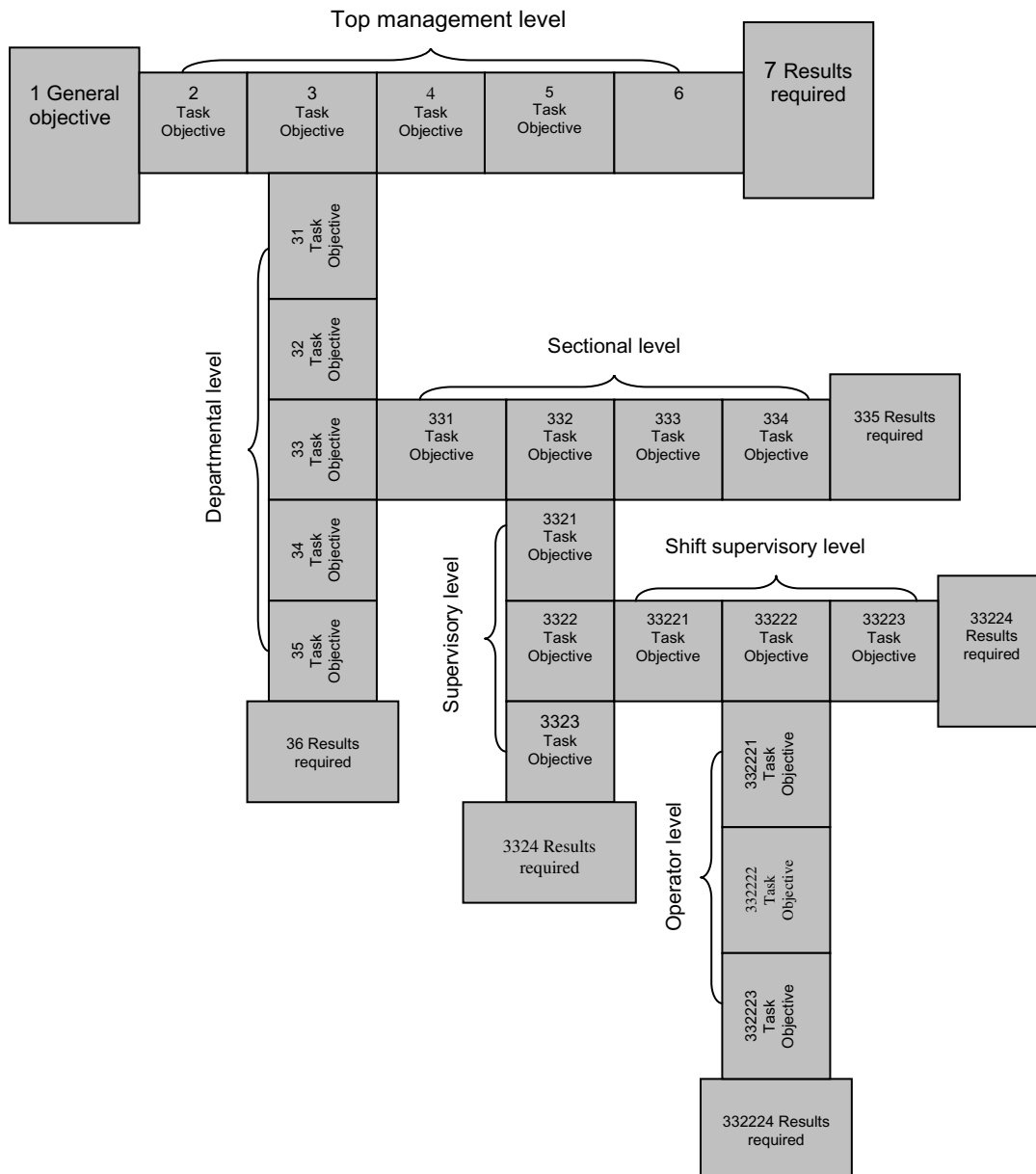
Figures 6.2 and 6.4 (a) to 6.4 (f) demonstrate the logical development of the work flow. If the work flow is not developed in a logical sequence the possibility that the employee would get confused and loose track of the comprehensive management logic increases. The consistent development of the work flow is an absolute requirement for the optimisation of the results required.

## **i) Procedure for development of the work flow**

For each of the selected alternative methods the following procedure must be strictly adhered to at all times (refer section 6.2.1.3 (a) and figure 5.10, 5.17 and 6.2):

- commence with the results required (refer section 6.2.1.1(e)),
- formulate the objective (refer section 6.2.1.2),
- develop the selected alternative method into main tasks (refer section 6.2.1.3 (a)),
- state the main tasks explicitly and as verbs (work), avoid over-elaboration,
- state the results required (performance standards) for each main task (refer 6.2.1.1),
- formulate the objective for each main task (refer section 6.2.1.2),
- develop each main task into supporting tasks,
- state the supporting tasks as verbs in a practical and logical sequence,
- state the results required (performance standards) for each supporting task,
- formulate the objective for each supporting task,
- develop each supporting task into controlling tasks,

- state the controlling tasks as verbs in a logical sequence,
- state the results required (performance standards) for each controlling task,
- formulate the objective for each controlling task,
- develop the tasks further where necessary until the end tasks are identified in situations where it is required,



**Figure 6.2: Example of the hierarchical development of the work flow in a typical mining organisation**

- develop alternative methods for the achievement of each set of results required up to the last task, and
- consider optimisation at each level and for each alternative set of tasks at all times.

## ii) Salient features of the work flow

The most salient features of the work flow are that it:

- logically describes the core business of the organisation and the employee,
- states the performance standards and objectives, aimed at the most efficient achievement of the results required,
- is the sum total of the results required or performance standards of the main tasks,
- is a perfect platform and vehicle for communication, decisionmaking and delegation,
- facilitates the development of the most efficient and functional organisational structure,
- is the ideal platform for participation, coordination, integration, creation of mutual commitment and acceptance of accountability (Gallie et al, 1998:90),
- facilitates the building in of the most productive work tasks (Walton, 1989:60),
- creates and develops trust (Barrat & Coppin, 2002:184),
- creates commitment and empowers employees,
- simplifies coding of the entire plan in the finest detail (refer figures 5.15 to 5.15 (d)),
- facilitates the adjustment and updating of plans and the development of what-if scenarios,
- enhances integrated hands-on management and control, and
- enables all employees and the organisation to comprehensively integrate and computerise individual, sectional, departmental and organisational plans.

## iii) Development of the work flow of a mine manager

The developed theory and the procedure to develop the work flow would now be applied in order to determine the work flow for the mine manager and his subordinates down to the operator level (refer section 5.4.3, 5.5.2, 5.5.3. 6.2.1.3 (b), figure 5.14, 6.2, 6.4 (a) to 6.4 (f)). The mine manager should follow the steps as outlined in section 6.2.1.3 (b) and demonstrated in figure 6.2.

The results required were stated in section 6.2.1.1 (e). The objective was formulated in section 6.2.1.2 (b). The best method with which to achieve the stated results in the most efficient manner would now have to be determined. The manager must determine the best alternative with which to achieve the required results and develop it into main tasks.

For the purpose of developing the most probable alternative methods the following three alternative methods were considered:

- Buy the coal in,
- Utilise a contractor to supply the required quantity and quality of coal, or
- Mine the coal self.

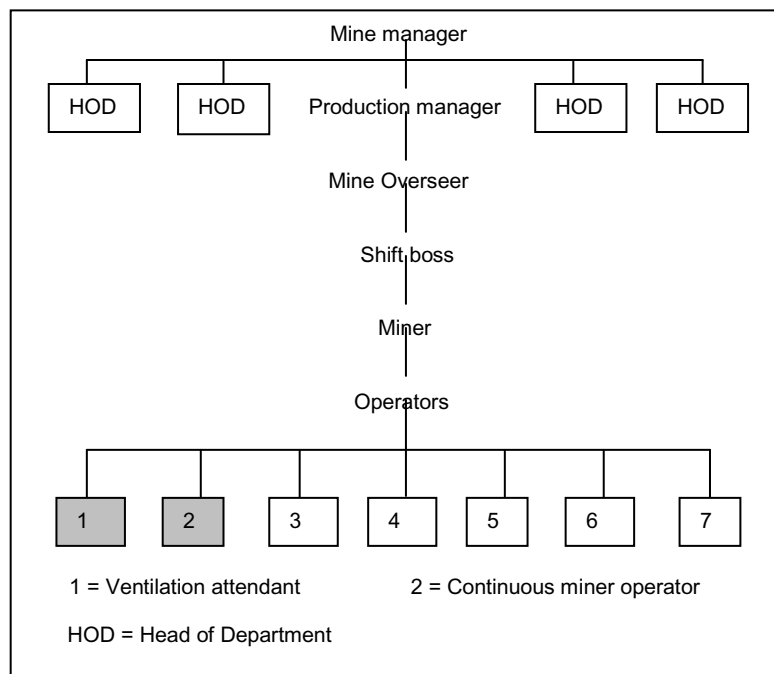
For the purpose of developing the work flow of the mine manager and each Head of Department (HOD) reporting to him the alternative to mine the coal self would be developed. This alternative is developed into the following logical practical main tasks for the mine manager (refer figure 6.4 (a)):

- Provide reserves,
- Provide financing,
- Provide equipment and facilities,
- Provide manpower,
- Obtain the coal, and
- Deliver the coal.

The manager would now have to state the results that he requires from each of the main tasks and then formulate the objectives and develop the main tasks into supporting tasks and each supporting task again into controlling tasks. The main task to provide reserves (in tan) would be utilised as an example to further demonstrate the rules of the work flow development. The total unit costs of the departments could be less or equal to but not in excess of the unit cost of R75.18 of the mine manager (refer section 6.2.1.3 (b) (i) and figure 6.2 and 6.4 (a)).

The results required from the main task to provide reserves are:

- reserves in excess of 150 million tons,
- coal quality of not less than 22.5 MJ/kg,
- cost not exceeding R3.
- 55 per ton mined, and
- accidents = Nil.



**Figure 6.3: A typical colliery production organisational chart**

The objective should be based on the results required from this main task. It can be formulated as follows:

**To ensure that adequate reserves are available at all times to satisfy the customer's contractual needs in compliance with statutory and legal requirements.**

Mine organisational structures could differ between the different mineral sectors and mining groups. Normally on underground collieries the structures would be very similar. A generalised underground colliery organisational structure is depicted in figure 6.3.

Alternative methods to realise the objective should now be developed and then the best alternative method should be selected. To provide and control the reserve base self is selected as the best alternative method to achieve the stated results.

It can now be developed into the following supporting tasks:

- reconcile reserves,
- utilise reserves, and
- acquire additional reserves when necessary.

The main requirements of the supporting tasks are that:

- they should adequately ensure the efficient achievement of the main tasks,
- they should be of a relative long-term nature,
- the total results required or performance standards of the supporting tasks should add up to the results required or performance standards of the main task, and
- the sum of the unit costs of the three supporting tasks should not exceed R3.55 per ton which is the unit cost of the main task to provide adequate reserves.

Each of the supporting tasks should be developed into controlling tasks. The main features of the controlling tasks are that:

- they are used to ensure the efficient execution and achievement of the supporting tasks,
- they would also be of a long-term nature,
- they are more subject to change or adjustment,
- the total results required or performance standards of the controlling tasks should add up to the results required or performance standards of the supporting task,
- the sum of the unit costs of the two controlling tasks of the supporting task to reconcile reserves should not exceed R1.43 per ton, and
- they control the execution of the supporting task in order to ensure the efficient achievement of the results of the supporting task.

The steps described above must be used to develop the main tasks and the work flow of the mine manager. The procedure would be applicable for all work flow developments. Once the work flow of

the mine manager is developed satisfactorily he would be in a position to delegate for the results required to his subordinates.

In the coal mining industry the main tasks of the mine manager are normally delegated as follows:

- provide reserves to the technical manager,
- provide financing to the financial manager,
- provide equipment and facilities and to deliver the coal to the resident engineer,
- provide manpower to the human resources manager, and
- supply coal to the production manager.

The delegation of results would be subject to the requirement that the work flow should be the optimum to deliver the most optimal performance. It is the first step in the development of the organisational structure. The heads of departments would go through the same steps as the mine manager and then in a feedback session jointly discuss their work flows with the mine manager and their colleagues.

The work flows of the heads of departments (HODs) reporting to the mine manager should commence or 'kick off' with the results required as delegated to them by the mine manager and could differ significantly from that of the mine manager. Once agreement had been reached the process should continue right down to the last levels in the organisation and to the last smallest tasks necessary. The task and resources analyses should be summarised and finalised from the lowest levels upwards to the top levels.

In the example the mine manager's main tasks to obtain and deliver the coal (in light green) would be used to demonstrate the flow and logic of the development of his work flow. It would also indicate the route of delegation from the mine manager to the production manager, mine overseer, shift boss, miner, continuous miner operator and the ventilation attendant and to the last tasks (refer figure 6.3, 6.4 (a) to 6.4 (f), and table 6.1).

After the completion of his own work flow the mine manager must develop his task and resources analysis as far as practically possible at this stage. It would enable him to identify the control measures for each task of his work flow. It would facilitate the delegation and controlling of the results he requires from each of his subordinates and the logical development of the work flows of his subordinates.

The potential total production of the eight production units is calculated at 5 322 240 tons per annum. At this volume the unit cost would also be less than the agreed upon R75.18 per ton. It is a sound approach that the mine plans on this higher volume. Extra production is always easier to cope with than below budget production.

In this example the process of developing the work flows and task and resources analyses of the line employees would be as follows:

- The mine manager should delegate the results to provide him with 5 322 240 tons per annum (443 520 tpm) of coal at a quality of not less than 22.5 MJ/kg and a unit cost not exceeding R21.93 to the production manager (refer figure 6.4 (a)).
- The production manager should delegate the results to provide him with 2 661 120 tons per annum (221 760 tpm) of coal at a quality of not less than 22.5 MJ/kg and a unit cost not exceeding R14.53 to each one of the two mine overseers in the production department (refer figure 6.4 (c)).
- Each mine overseer should delegate the results to provide him with 665 280 tons per annum (55 440 tpm) of coal at a quality not less than 22.5 MJ/kg and a unit cost not exceeding R11.53 to each one of the shiftbosses per shift in his department.
- Each shiftboss should delegate the results to provide him with 332 640 tons per annum (27 720 tpm) of coal at a quality of not less than 22.5 MJ/kg and a unit cost not exceeding R8.35 to each miner in his production section.
- Each miner should delegate the results to provide him with 1 260 tons of coal per shift (36 meter per shift) or 27 720 tpm (792 meter per month) and at a quality of not less than 22.5 MJ/kg and a unit cost not exceeding R5.35 to the continuous miner operator.

The rule is that the total results of the immediate subordinates of a particular supervisor should add up to but not exceed the results required from that specific supervisor. The production tons and the unit costs in the example used were taken to illustrate this point. This would apply to all the other results required where applicable.

The procedure should be continued with down the line as far as is necessary. This implies that:

- the best alternative method is developed into the most logical sequence of main tasks,
- each task necessary to achieve the results required is identified and included in the work flow,
- all resources and risks are identified,
- the necessary policies and procedures are compiled,
- the required control measures are compiled,
- all work are delegated,
- regular reporting on progress is instituted
- adequate corrective action is timeously taken, and
- the organisation can be scientifically designed.

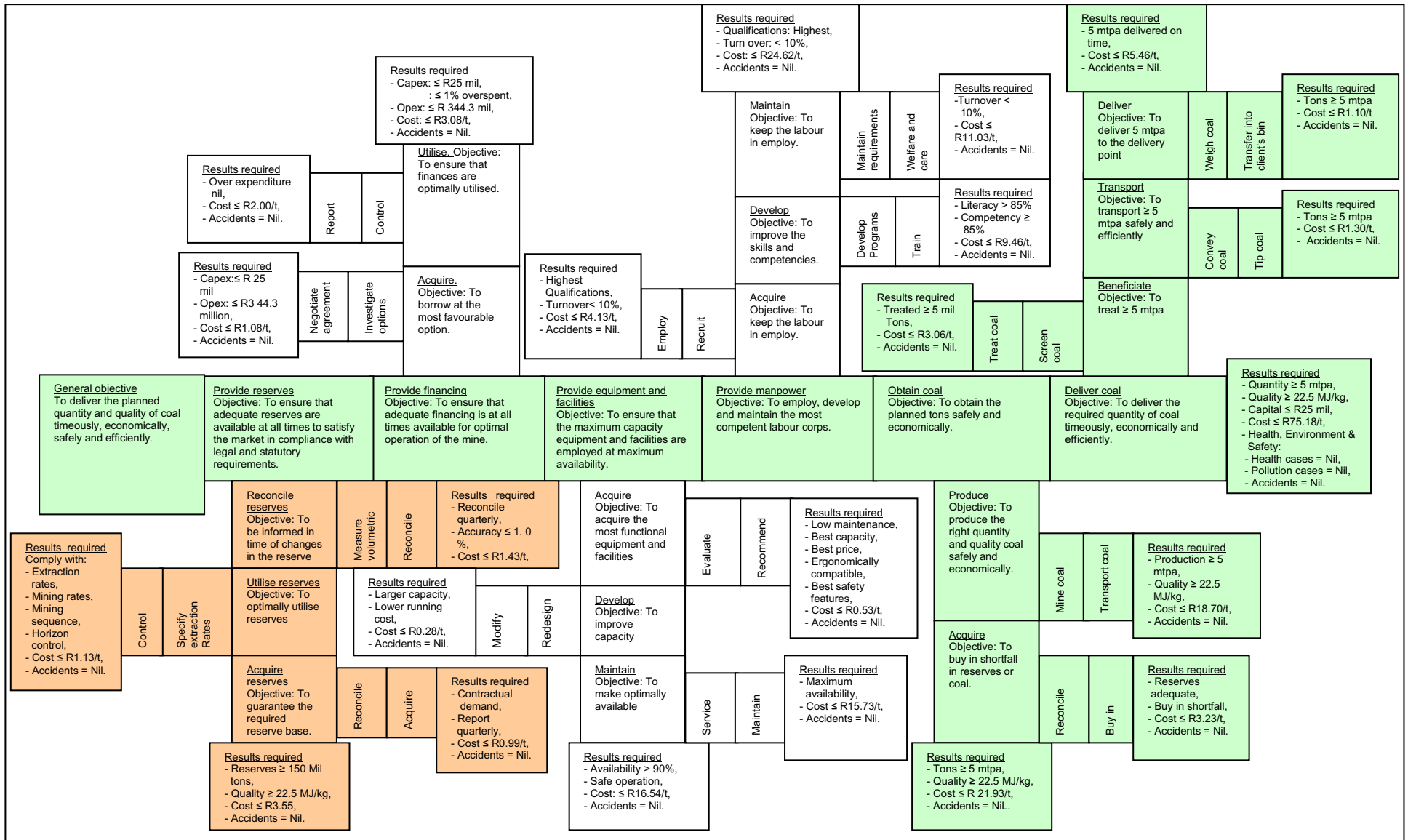


Figure 6.4 (a): Example of the work flow development of a mine manager



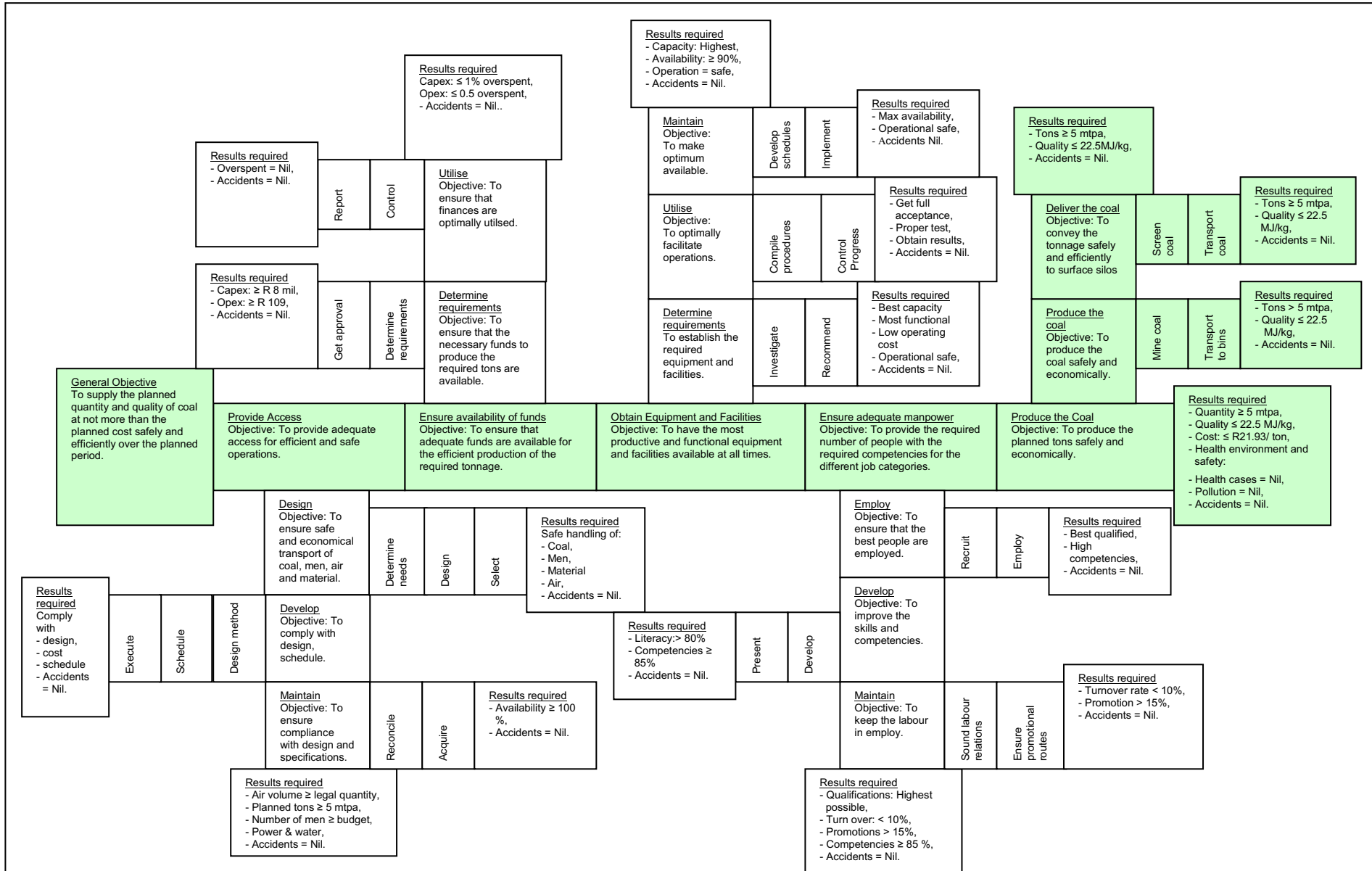


Figure 6.4 (b): Example of the work flow development of a production manager

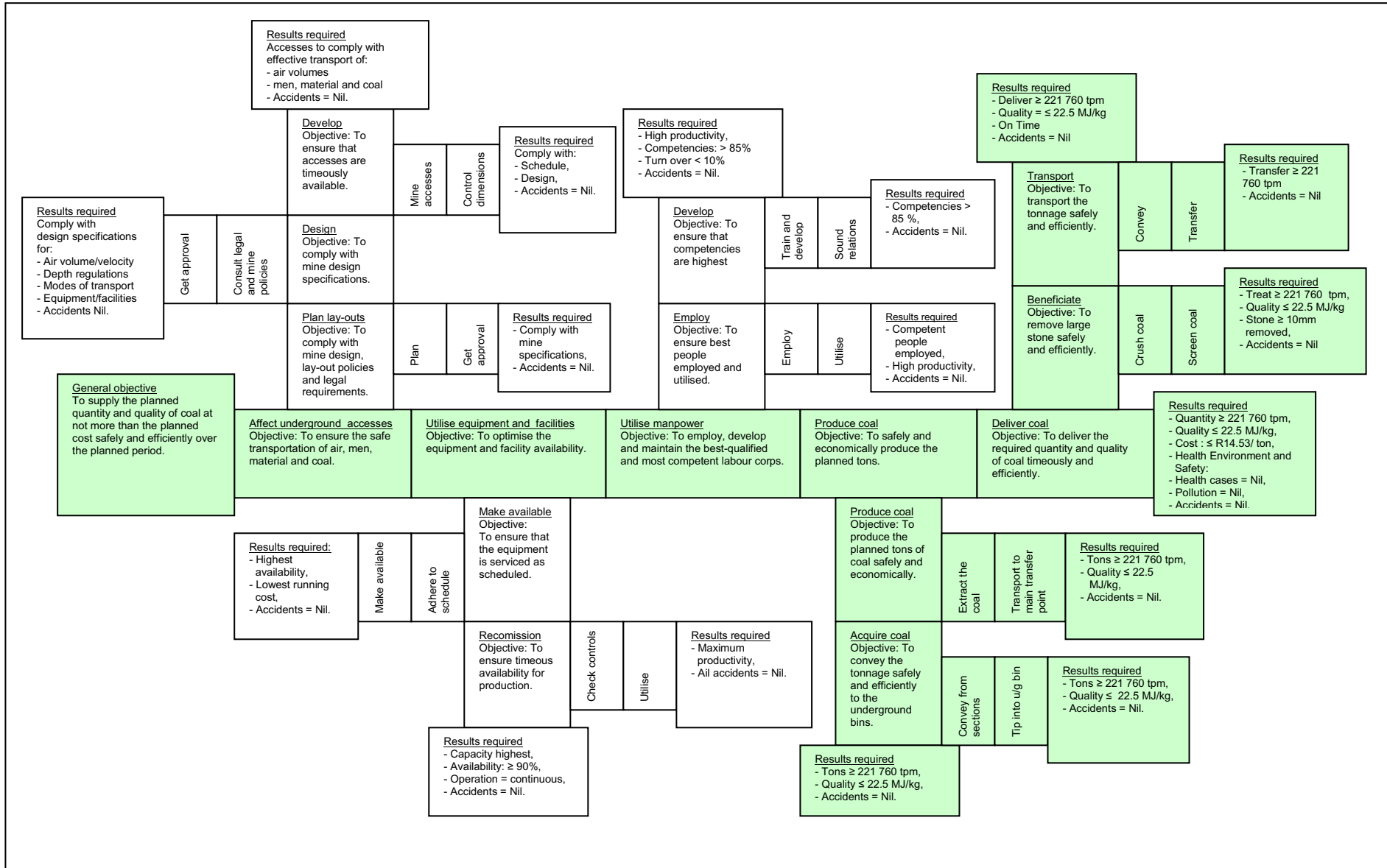


Figure 6.4 (c): Example of the work flow development of a mine overseer

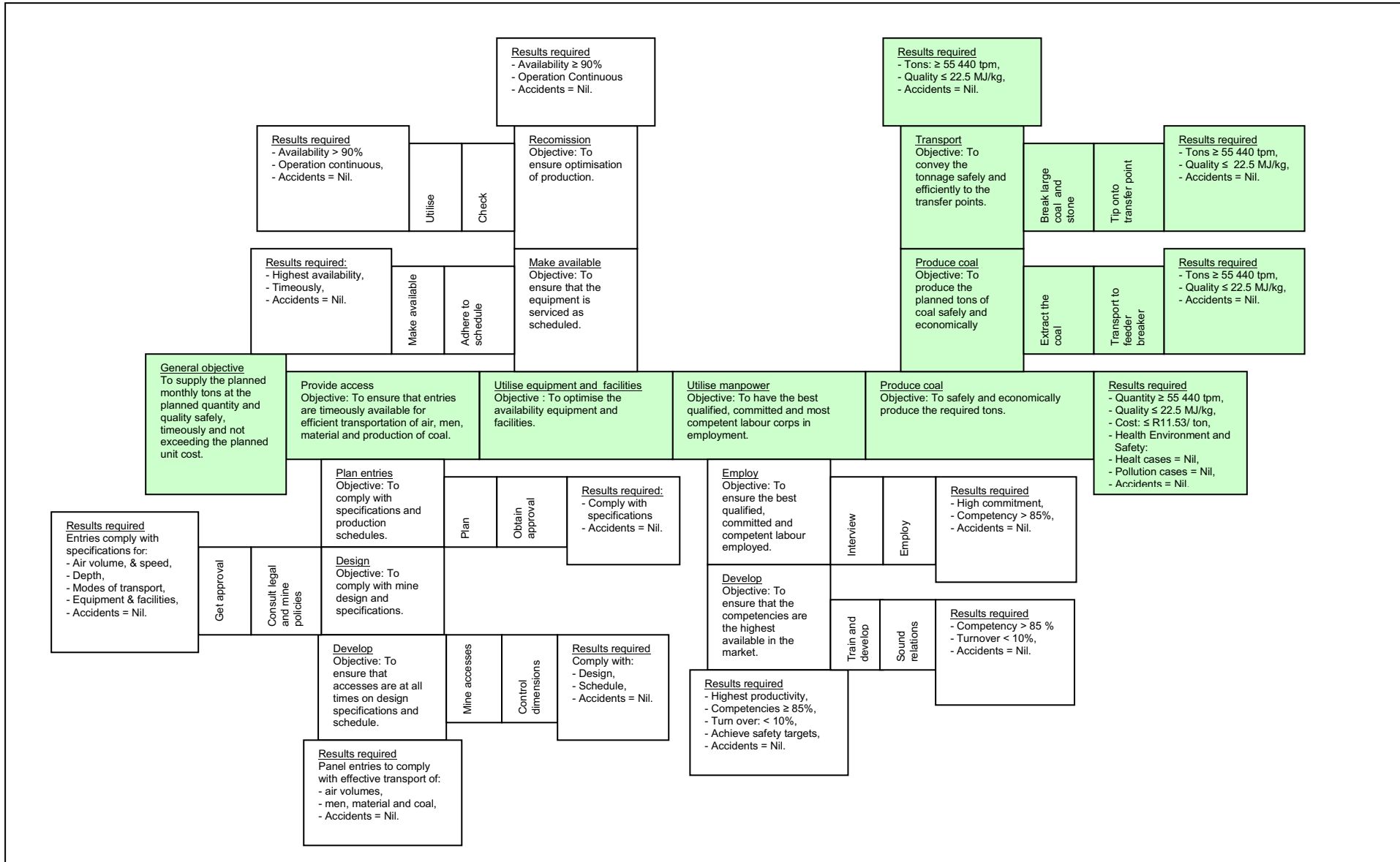


Figure 6.4 (d): Example of the work flow development of a shift boss

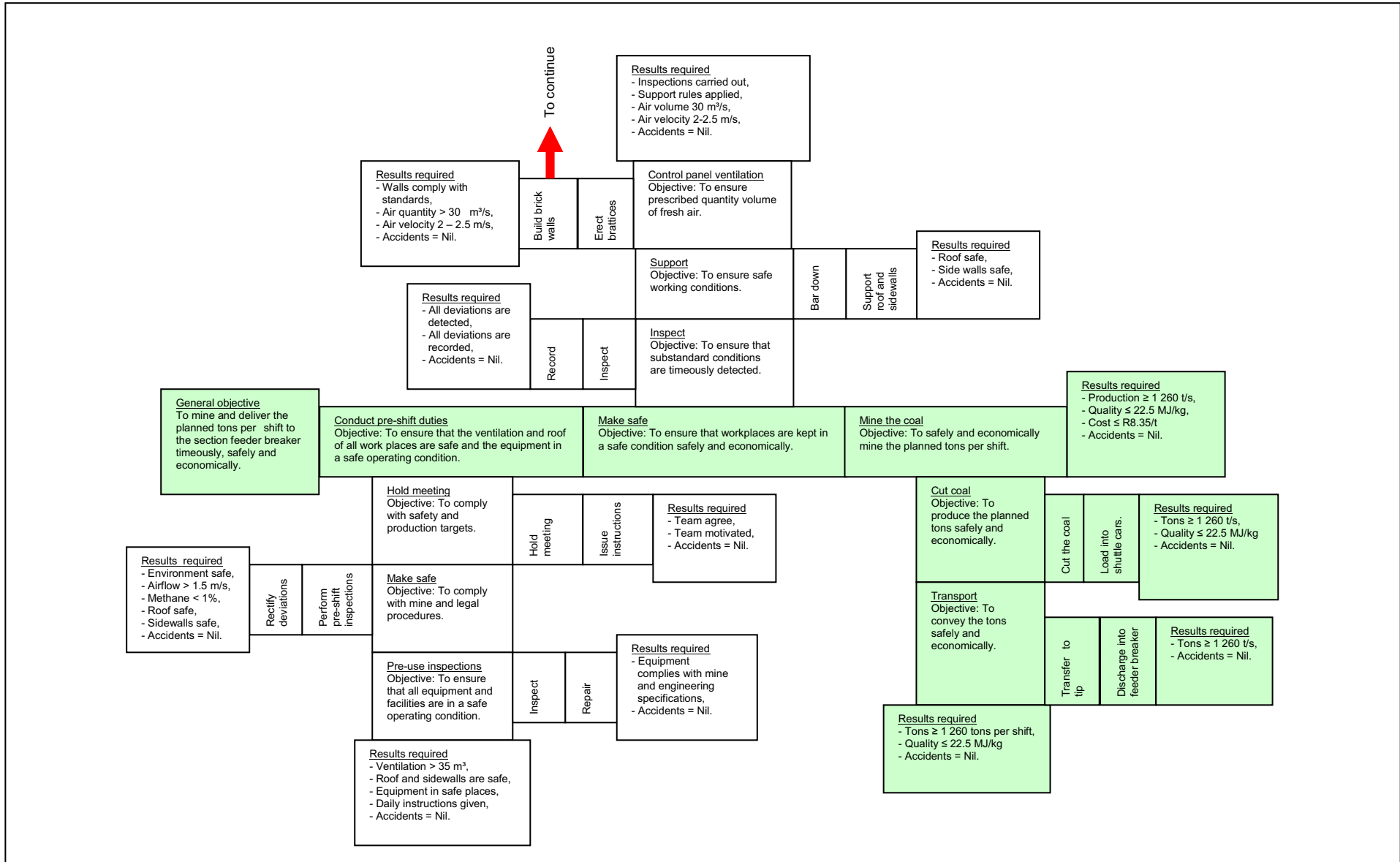


Figure 6.4 (e): Example of the work flow development of a miner

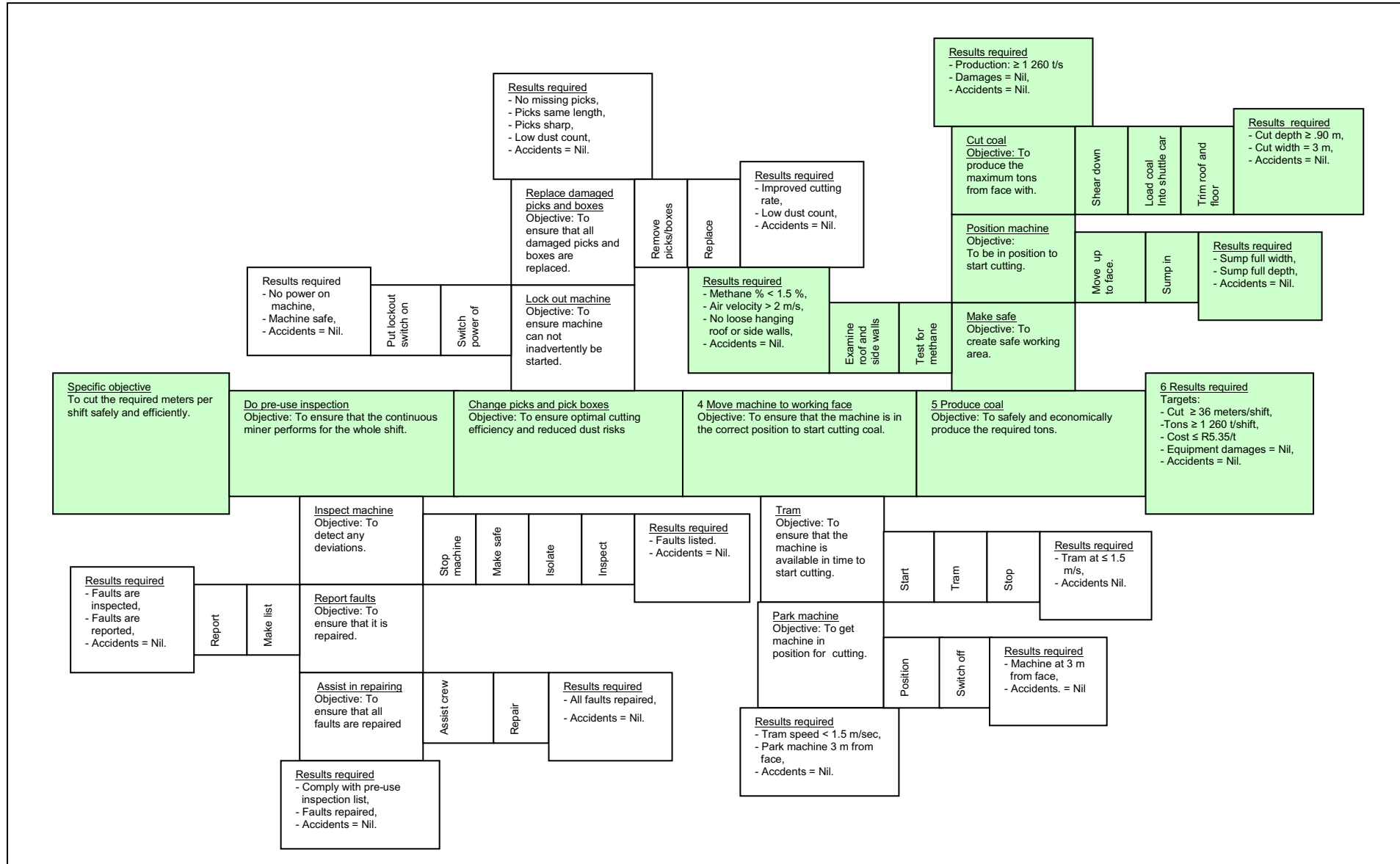


Figure 6.4 (f): Example of the work flow development of a continuous miner operator

### c) Development of the task and resources analysis for each selected alternative method

Many management theorists are of the opinion that to organise the manager's job one has to start from the bottom up (Drucker 1968:173). The theory of the comprehensive, practical and integrated management method, however, maintains that the manager can only efficiently develop his job by commencing with the results required from him by his supervisor, working progressively down to the last task necessary and then progressively up.

The development of the task and resources analysis commences from the top and is finalised from the last task of the work flow of each operator, working progressively upwards (refer section 2.2.1.1 (h), (i) and (j) and table 6.2 (a), 6.2 (b) and 6.3 (a) to 6.3 (h)).

From the work flow diagram the following procedure should be followed:

#### i) identify tasks

- list each task
- assign an intrinsic code to each task,
- state:
  - > the performance standards, company policies and rules,
  - > statutory regulations, and
  - > any other applicable laws, regulations, agreements or restrictions applicable to each task,
- state the objective for each task,

#### ii) determine the resources required,

- state the labour,
  - > state the number, and
  - > the unit cost.
- Determine and state the equipment and facilities,
  - > type,
  - > number,
  - > required capacity of each,
  - > capital required, and
  - > unit operating cost.
- Determine and state the time,
  - > starting time,
  - > finishing time, and
  - > duration.

iii) list the performance,

- identify possible deviations, and
- determine the possible resulting consequences,

iv) identify the most probable hazards,

- establish what can go wrong, and
- what the possible consequences could be.

v) assess all risks,

- determine the probability,
- the possible severity,
- the severity rating, and
- the type of risk.

vi) develop preventative measures

- state the type and method, and
- establish the responsibility.

vii) determine the control measures

- establish the inspections
  - > determine the method,
  - > the frequency of inspections, and
  - > the accountability.
- Establish the supervision measures
  - > determine the accountability, and
  - > the type of supervision.

viii) establish the reporting procedures

- determine the accountability,
- the frequency, and
- the type.

The budget for each alternative method would follow logically from the task and resources development. It is important to remember that the total of the costs, capital, equipment, manpower and other resources must be calculated from the bottom upwards. Table 6.3 (a) to 6.3 (h) represents the specific items depicted in tables 6.2 (a) and 6.2 (b) in a larger and more practical workable format for ease of application in the practical situation. The meticulous development of the task and resources analysis is an absolute requirement for efficient planning.

























Resources could include all resources necessary such as reserves, cost, equipment, people, instruments and material. Each resource would be evaluated in terms of the steps in the task and resources analysis. The necessary supporting plans or procedures should be identified and compiled during the compilation of the task and resources analysis. The supporting plans would support the managing of risks, safety, integration of work, coordination, communication, purchasing, labour recruitment and training and other work where applicable. This would eliminate the present haphazard compilation and introduction of policies, procedures, instructions and rules in a rather unscientific manner. It would minimise the omission of risks and would optimise the operational efficiency of the organisation.

The adjusting of the plan, creation of what-if scenarios, optimisation and updating of the plan or any section or part of the plan becomes extremely simple, efficient and cost effective. It is important to note that the risks not only for the tasks but also for the tools, equipment, material, environmental factors, rules and statutory laws and eventually for the methods of performing the tasks can most logically and efficiently be determined with this management method.

With the development of the tasks and resources analysis the time element for each task is identified. Since the development of the tasks follows from the need to realise an objective and objectives need to ultimately support the objectives of the supervisors, tasks are grouped and eventually consolidated into posts based on the requirements of realising a common objective during a shift. Posts can now be developed. The required qualifications, recruitment specifications, job descriptions and training schedules follow logically from this. As part of the development of the work flow and the task and resources analysis the organisational structure would be automatically developed. All the required technical work is developed during the development of the work flow and tasks and resources.

The task and resources analysis development sheet should be used intelligently in order to obtain the maximum benefits from it. For example one task could normally have more than one performance standard that it has to comply with. More than one possible deviation, hazard evaluation, consequence, preventative and control measures would normally be developed for one task. It would, therefore, be wise to fully develop each task before commencing with the next task. The development of the task and resources analysis breakdown sheet would as a rule be developed from left to right and finalised from the right to the left of the sheet.

The legend should be organisation-specific and would depend on the personal choices, preferences and requirements of the employees and the tasks. The purpose with the legend is to facilitate the application of the task and resources analysis breakdown sheet and the computerisation of the planning and management process.

At the operator or worker level the work flow and the task and resources analysis must be developed into the smallest possible tasks and resources. This would form the basis for the comprehensive, practical and integrated management method, capable of optimising all the

resources of the organisation, the loyalty, dedication, commitment and ingenuity of the organisation's most valuable asset, people. Allen's problem to propose a meaningful logic or taxonomy for the classification and practical application of management and technical work would therefore be solved with the introduction and application of the comprehensive, practical and integrated management method.

The mining industry has lately expressed serious concerns over its continually deteriorating position in the competitive global environment (refer section 1.2.9.7). The author of this thesis is convinced that the mining industry would have much more success in achieving optimal safety and operational excellence if they implement and apply the comprehensive, practical and integrated management method on all the levels of the organisation.

#### **6.2.1.4 Develop the organisational structure**

Most of the development of the organisational structure would follow from the task and resources analysis (refer section 2.2.1.1 (p) and 6.2.1.3 (c)). The organisational structure is necessary for the determination of the number of posts and consequently the number of people. Only once the number of people had been determined the labour cost could be established and the budget finalised. The main elements of the development of the organisational structure would, for clarity, be briefly discussed in the following sections.

##### **a) Integrate the tasks supporting a single objective**

Commencing at the operator level right at the bottom of the task and resources analysis development the tasks supporting a single objective should be grouped and integrated. The average duration time of the tasks is available from the task and resources analysis. It should be added up in order to group tasks until the total time required for example of the realisation of the specific objective of 42 meters cut per shift of the continuous miner operator is determined. Should the total time be less than the average effective shift time of six hours, the possibility of including related tasks with the previous tasks could be considered. If the total time required completing the tasks to cut the target meters is about five hours then the feasibility should be considered to train the operator to, also in addition to his normal tasks, carry out the pre-use inspection tasks. On the other hand should the time required to realise the objective be more than the shift time the target should be revised and adjusted to comply with the available shift time limit (refer table 5.2).

##### **b) Develop the required posts**

The posts should be formed from the bottom up and combined to form the teams and the first lines of supervisory posts (refer section 2.2.1.1 (o) and table 5.2). This is achieved by applying the logic of combining tasks that support a single objective. The tasks should be combined until the time required to perform the tasks equals the average effective shift time. This process

should be followed to develop the middle management and top management posts. The final or main objective would also be the objective of the chief executive officer and the organisation as a whole (refer section 2.6.2.8 (a) and (b)).

### **c) Form sections and departments**

Once the tasks had been grouped and integrated and the posts developed the different sections and departments can be developed. A section would be serving a predetermined objective such as the delivering of a certain production volume or the supplying of specific maintenance services. In other words a section would then be the unit that would have to realise a predetermined objective.

A department would consist of a number of sections that all contribute towards realising an objective such as the delivering of the total planned production of the mine, the supplying of all the maintenance services to all the departments in the organisation or the supplying of all the financial services of the organisation. The golden rule is that posts, sections and departments have to comply with the requirement of realising objectives that contribute to the realisation of the general objective of the organisation.

All the departments and sections must efficiently function together so that all the objectives and ultimately that of the organisation as a whole are realised in the most efficient manner. The objectives of the different stakeholders should be coordinated to ensure the maximum effort in the realisation of the specific objective.

In the production sections the objectives of all the operators should be coordinated to eventually culminate into the production department. Very important is that the objectives of the other stakeholders such as the maintenance people be coordinated with that of the production people in order to facilitate the optimisation of the operations within the sections. This argument would apply to all the different sections and departments in an organisation.

In order to optimise the results of the section, department or organisation the most functional relationships need to be established (refer section 2.2.1.1 (t)). Each employee must understand that the other stakeholders in the specific environment all have delegated results to deliver in order to achieve the total results required from the section, department and organisation in the most optimal manner.

Every employee therefore needs to understand and accept that he has to supply the information, services and support where necessary to the specific stakeholders. The relationships would be determined with the development of the posts during the development of the task and resources analysis.

#### **d) Establish accountabilities**

In this thesis accountability is defined as the obligation that an employee undertakes to deliver specific predetermined results within the agreed time and performance standards. The time and performance standards had been established initially during the development of the work flow and finalised with the development of the task and resources analysis (refer section 2.2.1.1 (c)).

#### **e) Delegate for the achievement of the required results**

The supervisor must now officially delegate the work to a specific subordinate (refer section 2.2.1.1 (q)). He needs to clearly specify the results he requires from the specific subordinate. He also needs to specify the standards of performance that the required results have to comply with. It would be extremely important that each subordinate should understand and accept the performance standards required by the supervisor. It should in fact be a negotiated and mutually accepted process.

Allen (1973:123) defined delegation as:

"Delegating is the work a manager does to entrust responsibility and authority to others and to create accountability for results."

Once the subordinate agreed to the results and the performance standards he accepts full responsibility and becomes accountable for the delivering of the results at the specified performance standards. He now should have the authority to take the necessary decisions to enable him to deliver the agreed-upon results.

#### **6.2.1.5 Schedule the tasks of each selected alternative method**

Scheduling the tasks of each selected alternative method is the establishing of the time sequence and logical arrangement of the tasks for the achievement of the planned results in the most efficient manner (refer section 2.2.1.1 (j)). Once the work flow and the task and resources analysis had been completed the tasks can be scheduled and the critical paths determined in order to further optimise the time duration in achieving the results required, eliminate duplication and enhance integration and coordination (Eppen & Gould, 1979:643). The schedule in itself is a major tool for the controlling of progress and should be adjusted when and where necessary.

#### **a) Establish priorities**

The development of the work flow must be seen as a reasoned decision-making process. The mine manager for example would, during the development of the best method to deliver the required results, not commence with producing the coal before he had established what the

expected geological conditions would be, how it should be managed and what the costs to do it to the specific department and company would be.

The main tasks of each alternative method should be developed in a logical manner. This is achieved during the development of the work flow. From the main tasks onwards all the 'best' methods to achieve the stated required results should be logically developed in terms of the priority of the tasks (refer section 6.2.1.3 (a)).

#### **b) List the tasks in sequence**

With the comprehensive, practical and integrated management method the order of tasks is a logical outcome of the work flow development. The tasks are automatically developed and listed in sequence during the development of the work flow and the task and resources analysis.

#### **c) Compile critical paths**

Time is a very important element in the planning and execution of plans. It costs money and is critical in the optimisation of the operations. It is necessary to determine for each task the:

- starting time,
- finishing time, and
- the average duration time.

The time elements would be established during the development of the task and resources analysis. With the initial implementation of the comprehensive, practical and integrated management method it would be advisable to utilise professional time and motion study experts where necessary.

Eventually it would be advisable to train all the employees to determine these time elements where and when required. The time elements of tasks would assist the employee in optimising a specific operation by introducing shorter and equally or more effective steps (refer table 6.1 (a) and 6.1 (b)).

#### **d) Optimise critical paths**

The aim of the critical path analysis is to optimise the time that an operation would take to be successfully completed. Without the critical analysis of each task and operation it would not be feasible to optimise the operation (refer section 2.5.1.1 (b)). It may prove more advantageous to replace long duration tasks by shorter duration tasks with no detrimental effects on the outcome and quality of the required results. Apart from the obvious advantages of optimising the time duration of operations and ultimately the specific alternative method, critical paths are also imperative for more effective control.

### **6.2.1.6 Finalise the budget for each selected alternative method**

#### **a) Summarise the resources required**

The budget largely flows logically and immediately from the task and resources analysis. It reflects and interprets the resources in terms of the finances, labour, material, equipment, time and the facilities and tools necessary to efficiently achieve the results required (refer section 2.2.1.1 (k) and table 6.2 (a) and 6.3 (b)). Each manager is accountable for the budgets that are developed in his department. To ensure that the budget is compiled, as efficiently as practically possible, the manager must ensure that all the stakeholders are involved in the budgeting process, accountability is explicitly established and that the reporting responsibilities of the stakeholders are determined and accepted.

#### **b) Determine financing requirements**

The financial requirements are determined during the development of the task and resources analysis. It is imperative that management differentiates between capital and operating requirements. Each would require different acquisition and control measures (refer table 6.2 (a)).

#### **c) Express requirements in measurable quantities**

It is important for effective budgeting and controlling that the required results be expressed in practical, understandable and measurable units for each post. This would be performed during the development of the work flow and task and resources analysis.

### **6.2.1.7 Select the best alternative method**

Up to this stage the work flow, task and resources analysis, schedule and budget for each selected alternative method were compiled. The manager now has at his disposal a number of result outcomes, which must be evaluated in order to select the best method (refer section 2.2.1.1 (l)). The best method would be the one that would enable the manager to achieve the results required most efficiently as far as is practically possible. The manager must therefore endeavour to select the best method by means of the planning work performed.

The main purpose with the selection of the best alternative method is to ensure that the results required are achieved in the most efficient manner. This step as one of the most crucial steps in the planning process is rarely performed in practice. In the case where attempted it was normally performed unscientifically. As a result the best course of action is in most cases not implemented. Although the proposed procedure involves a lot of work it would handsomely pay for itself simply because the best course of action would be taken. In order to make the best choice each employee in the organisation should follow the following steps:

**a) State the results required**

The manager must at this stage state the mutually agreed upon results required, arrived at in section 6.2.1.1. These are the results that he has to achieve. The alternative methods were all developed in terms of these results. The manager must compare the results determined for each alternative method with the results required. Should there be significant differences negatively or positively impacting on the required results he must identify the magnitude of these differences (refer section 6.2.1.1 e).

The manager must perform a SWOT (strengths, weaknesses, opportunities and threats) analysis on each developed alternative method. Normally every alternative method would have strong as well as weak points. Associated with each would most of the time be identifiable opportunities and threats. The manager must identify these features and optimise and minimise it where practically feasible.

**b) Make combinations where applicable**

It may well happen that some of the strong points and opportunities of each alternative method could be utilised in optimising the alternative method. In such an event the manager must endeavour to combine these strong points with the strong points of the other alternative methods. The task and resources analysis is particularly suited for the incorporation, combination and optimisation of the strong points of alternative methods. Once computerised it would be fairly easy and cost effective to 'play' around with different what-if scenarios.

**c) Evaluate each alternative method against the results required**

The results of each one of the alternative methods must be evaluated against the most probable achievable results (refer section 6.2.1.1. (e)). It is possible that some of the results could be better than some of those of the most probable achievable results. For example the total production output may be in excess of what is required but the unit cost could be considerably higher. It is also quite possible that all the results of one alternative may be much better than those originally estimated but that the risks involved could be totally unmanageable. In such a situation the responsible employee should endeavour to identify and incorporate those tasks which would contribute to the development of a better alternative method.

Although it would involve a lot of work it is the duty of every employee in the organisation to develop the best plan practically feasible. In the long run the best plan would pay for itself in many ways especially in profits and the safety of employees. The manager or employee needs to consider all the advantages and disadvantages in order to arrive at the best decision. It is not always possible to calculate the advantages in exact terms but then someone has to rely on past experience or 'gut feel' and opinions of the other stakeholders.



#### **d) Select the most probable best alternative method**

The most probable best alternative method and hence the most probable achievable results would be the outcome of the steps discussed up to this point. It would be wise to have a last look at the possibility of improving this choice further before making the final decision to implement it.

#### **e) Optimise the selected most probable best alternative method**

The manager must adjust the method, if necessary, with the strongest or most positive aspects from the other alternative methods in an effort to optimise the results required even further (refer section 2.2.1.1 (w)). This final adjusted method in actual fact should be the best method.

The manager would now be in the best position to select the most probable achievable results. These results and the method that supports it must then be selected. It must be fully developed in terms of the work flow, task and resources analysis, scheduling and budgeting and implemented as the plan. In practice mine management do not always develop different alternative methods and select the best method. In reality the management theory to develop and arrive at the logical best method does not exist at present.

### **6.2.2 Implement the plan**

Normally the plan needs to be studied, discussed and approved before it could be implemented (refer figure 5.15 (b) and table 5.2). The process of implementation should consist out of the following tasks:

#### **6.2.2.1 Obtain approval for the plan**

##### **a) Discuss the plan with the stakeholders**

All stakeholders should be involved in the process of obtaining the final approval. Normally the manager accountable would discuss the plan with the stakeholders in his area of responsibility and adjust the plan where necessary.

##### **b) Reach agreement**

The discussion with the stakeholders would serve to ensure that any omissions of new ideas or legitimate concerns could be discussed and solved before the implementation of the plan. The manager should test the plan with probable what-if scenarios. The previous inputs to the plan from the stakeholders should be specifically tested. Complete association, acceptance and commitment with the plan should be obtained. Once all the stakeholders agree with the plan the manager should establish accountability with each one of them for the results he requires

with the plan. The plan now becomes the domain and accountability of the manager. Before he could present it to his supervisor for approval he should ensure that he is satisfied and prepared to commit himself with the results required from him.

### **c) Adjust the plan where necessary**

The manager must at this stage present the plan to his supervisor. He must emphasise that this plan is the best to deliver the results required from him and also outline the contribution and improvements the plan would make to the supervisor's results and to the results of the organisation as a whole. He should ensure that the results of the plan fully comply with all policies, regulations and standards applicable to the organisation. Where it would affect the results of other stakeholders he must point that out and to what extent. If the plan needs to be approved higher up in the hierarchy it would be the responsibility of the supervisor of the manager to obtain the approval.

### **6.2.2.2 Provide financing**

In most situations in the mining industry financing would involve third parties, usually in the form of loans, share issues, mergers, direct purchases, take-overs or in some instances the formation of new ventures between local and international industries for relative large capital requirements. Usually mining ventures are extremely capital intensive and the sharing of responsibilities is a method to reduce risks and to ensure commitment and continual support of the main interest groups.

Eskom, in the early years, preferred to supply the capital for at least a major share of the project. It then would stipulate specific conditions such as the sole right to the coal reserves for the life of the power station and surety of supply. Importers of coal would normally share in the financing of the project with exclusive rights of supply and price benefits. Operating capital requirements would form part of the budget and could be financed out of retained profits.

### **a) Determine the financing requirements**

With the determination of the equipment and infrastructure, during the planning phase, the capital requirements would be determined. The mine would invite tenders for possible purchasing and evaluate these tenders for the best possible suppliers. A sound practice would be to visit the factories of the potential suppliers of equipment in order to evaluate the product quality, ergonomical features, production capacities and general record of supply and service to customers (refer table 6.2 (a)).

### **b) Determine potential financing sources**

Once the suppliers of equipment and facilities had been decided upon and the final acquisition prices negotiated and confirmed the required capital would be finalised. The conditions of payment, delivery times and insurance of equipment would be negotiated and confirmed.

### **c) Negotiate acquisition agreements**

Normally the partners would supply the major share of the financing requirements. Each partner would make its own arrangements as far as the acquisition of its share of the capital is concerned. Different financing sources have varying conditions and the specific partner would be wise to be on the alert for loopholes or potential problem areas in the agreements.

### **d) Select the best option**

In the mining industry the financing arrangements are of a long-term nature and various factors such exchange rates, inflatory trends, labour stability and conditions of pay back need to be considered. The company should utilise various financial instruments to determine the best options. Regardless of the sophistication of the evaluation and forecasting instruments it remains at best a difficult and risky decision. Specific protection clauses to the company should be negotiated where possible.

## **6.2.2.3 Provide equipment and facilities**

### **a) Determine required capacities**

The determination of the capacities of the equipment and facilities would mainly be a factor of the:

- i) expected lifespan of the venture,
- ii) planned production requirements,
- iii) compatibility of equipment and facilities,
- iv) historical operating costs of the equipment and facilities,
- v) purchasing prices, and
- vi) availability of equipment and facilities.

### **b) Select the most suitable equipment and facilities**

The decision to purchase specific equipment and facilities are mainly determined by:

- i) the required and available capacities,
- ii) the performance history,
- iii) potential of performance,
- iv) experience of other users,

- v) ergonomics,
- vi) suitability to be modified and upgraded,
- vii) compatibility with existing equipment and facilities in the company and group,
- viii) stockholding requirements,
- ix) delivery times of spares, and
- x) trade-in values.

#### **c) Arrange acquisition conditions**

Organisations use various economic techniques to determine the most favourable acquisition conditions. Various options are normally proposed but in the majority of situations suppliers prefer outright purchases or paying in instalments. Lately some suppliers prefer rental agreements. Each alternative has certain advantages and disadvantages that need to be evaluated carefully by the company in order to take the most economical decision.

#### **d) Arrange deliveries**

To meet planned due dates orders should be placed with a view to have the equipment delivered, inspected, installed and tested operationally in time for the commencement of production operations. That would mean that orders should be placed with realistic lead times in order to make reasonable allowance for possible contingencies. The effects on the company of too early or too late deliveries should always be considered as a factor with possible serious financial consequences.

#### **6.2.2.4 Provide people**

Provision of the most competent people available in the labour market remains a high priority of any plan. The company's results are directly related to the competency, commitment and loyalty of its employees. Labour costs had become one of the major components of the unit cost of production. It is imperative that the most competent and the correct number of employees be employed.

#### **a) Establish complements**

The type and number of labour is determined during the planning task (refer table 6.3 (b)). One of the objectives of the task and resources analysis would be to determine the type of employees, the skills and competencies and the number of employees required with which to realise the general objective of the company. One of the major selection criteria would certainly be the potential of employees to be developed technically and in the work of management. The higher the potential the sooner the employees would become qualified for advancement. The number of labour is determined by using an eight-hour shift time per day per employee as basis.

The time required to efficiently perform a task would also be an outcome of the task and resources analysis (refer table 6.3 (b)). The supervisory labour should be established in a similar manner. A supervisor or manager should be accountable for the realisation of a common objective. In the case of the determination of the supervisory labour factors such as complexity of the tasks and post, supervisory and reporting requirements, travelling distances, mode of transportation and the nature of the work should also be considered.

#### **b) Develop job specifications**

During the development of the work flow the tasks required for each post were systematically determined in detail. These tasks would constitute the basis for the specifications of the specific post (refer sections 2.2.1.1 (n) and table 5.2). The sophistication, competency, skills and physical attributes required for each post would be developed from the task and resources requirements.

#### **c) Recruit people**

The recruiting specifications are directly compiled from the work flow and task and resources development (refer section 2.2.1.1 (n) and 2.2.1.2 (e)). The academic and physical requirements for each post could be derived from the work flow and task and resources development. The specifications would form the basis for the interviewing, selection and appointment of the most competent candidates available in the market. The task and resources analysis would, to some extent, assist in deciding on the recruitment methods and procedures to be applied.

#### **d) Appoint the most suitable applicants**

It is commonly accepted that employees are the most valuable assets of companies. It would therefore be imperative to endeavour to appoint the best available people, train and develop and empower them to be optimally competent in their work (refer section 2.2.1.2 (f) and table 5.2).

#### **e) Compile training and development programs**

The training and development courses would largely be derived from the tasks and equipment and facilities developed during the work flow and task and resources development (refer section 2.2.1.1 (y), 2.2.1.2 (h) and table 5.2). Where and when required additional training courses should be developed or acquired.

Taining is normally of a repetitive nature. The periods required for training and development and repetitive training of each part of the post and the post as a whole would be a factor of the sophistication and physical and intellectual demands of the specific post as well as the possible

advancement possibilities. Organisations should as a rule exercise strict control over training because it could become a high cost item if not judiciously determined, applied and controlled.

#### **f) Train and develop people**

In competitive labour markets employers need to be fair at all times in order to acquire and retain the labour with the required competency. The lack of specific knowledge, skills and competencies with regard to each appointee could be established during applications and interviews. The necessary training and development could be given once the appointee commences with service (refer section 2.2.1.2 (h) and table 5.2). An important requirement is that the company should endeavour to retain his labour. It should, therefore, develop and practice realistic, fair and competitive conditions of service agreements.

#### **6.2.2.5 Commission the approved plan.**

##### **a) Construct the facilities**

Before the plan could be put into effect the planned facilities need to be constructed according to the planned specifications in order to meet the performance standards developed during the development of the work flow and task and resources analysis. Substandard installations would inevitably result in unnecessary stoppages, increased costs, losses in production, poor health and safety performance and environmental pollution problems (refer table 5.2).

##### **b) Commissioning of the equipment and facilities**

Once the equipment is available, constructed, operationally tested, approved and the specific employees trained in the operating of the equipment and the facilities production can commence. The incumbents to which the various posts were delegated need to take control of their specific posts and commence to deliver the results for which they would be accountable. The operating procedures for controlling risks, supervision schedules, control and reporting, identified during the development of the task and resources analysis must as a prerequisite be utilised in order to ensure optimal operation and performance (refer tables 6.3 (f) to 6.3(g)).

##### **c) Delegate accountabilities**

At this stage of the plan it becomes necessary to delegate fully to the specific selected accountable employees. In the first stage of the delegation the employee was entrusted with the obligation to plan for the results required from him. Once these results had been discussed with the relevant stakeholders and adjusted and approved the second stage of the delegation should be completed. The second stage entails the acceptance by the employee to deliver the results as approved with the planned equipment and facilities and labour within the specific environment. It would mean that he would have to comply with all the policies, rules and

procedures applicable to his area of accountability. The supervisor should finally, preferably in writing, instruct the employee to deliver the required results in the most efficient manner at all times and give him the necessary authority to take all the decisions necessary in order that he could perform his work efficiently. If in agreement the employee should accept his accountability in writing.

#### **d) Commence to produce**

The first phase of the commencement of production should be on a test basis. This means that each part of the organisation should be gradually brought into operation up to the full planned production performance. Any deviation should be investigated, evaluated and corrected until the total organisation is in the desired planned operational condition. Only then the operations could be synchronised with all departments and stakeholders and finally tested. One of the greatest mistakes that mining concerns are inclined to make is to start 'pushing for results' as and when facilities become available. The wise thing to do would be to plan for the gradual running-in of the organisation.

#### **6.2.3 Control the performance**

In this thesis controlling is defined as the management work of measuring, evaluating and correcting individual and organisational performance to ensure that the performance complies with the stated standards planned. Once the plan is implemented the performance of the operators, sections, departments and the organisation as a whole must be regularly controlled in order to ensure that the planned results are achieved (refer section 2.6.2.4, and table 5.2).

The time periods at which performance are measured would increase from that at the operator level up to that of the chief executive officer level. For example the performance of the continuous miner operator may have to be measured, evaluated and corrected several times during the course of the production shift. To produce a normal accepted target of 1 200 tons per shift and the legal limitation to a maximum of 20 metres length cut without through ventilation about three ends would have to be cut during the shift. Regular inspections by the miner, the immediate supervisor, should be conducted to timeously detect substandard performance in order to maintain and improve performance and safety.

Negative deviations would negatively impact on safety and the total production for the shift. If not timeously detected it could result in accidents, damages to equipment and facilities and a loss of life and production. Changes on the higher levels normally do not have immediate direct quantitative influences and would not necessarily reflect as an underperformance; however, on this level changes or triggers such as decrease in demand or production cost increases could be catastrophic.

Once the plan is implemented ‘things’ would start to happen and the performance need to be timeously measured, evaluated and corrected where and when required. It is imperative that strict procedures should be instituted and maintained in order to ensure that performance are timeously measured, evaluated and corrected where and when necessary. The performance standards and the inspection and supervisory procedures for each task and resource are determined and stated during the development of the task and resources analysis (refer table 6.3 (a), 6.3 (g) and 6.3 (h)).

Supervision is defined as the management work of overseeing a task or tasks carried out by subordinates to ensure that it is performed according to the planned standards. It would normally consist of direct and indirect over-supervision. The immediate supervisor carries out the direct supervision and his supervisor the over-supervision. For example the miner should carry out the inspection of the performance of the continuous miner operator and the shift boss would carry out the over supervision. Supervision should consist of accountability, the type of supervision and regular reporting (refer table 6.3 (g)).

Inspection is defined as the task of the physical observing, measuring, evaluating and correcting deviations from actual results to the stated standards (Dessler, 1982:557). The inspections should consist of the method of inspection, the frequency and accountability (refer table 6.3 (g)).

### **6.2.3.1 Measure performance**

#### **a) Measure actual performance**

The performance of every task from the smallest to the largest task in an operation must be controlled in order to ensure that performance standards are achieved.

To ensure that performance is timeously controlled the employee should:

- i) compile performance standards,
- ii) specify the units in which to express performance,
- iii) record the measurements.
- iv) record the deviations,
- v) correct those that should and could be corrected on the spot, and
- vi) give feedback to stakeholders where necessary.

The results of the measurements and corrective action must be reported on a prescribed reporting form for record purposes and for possible further action by management. It is good management practice to measure performance results in order to control performance, determine trends and institute timeous corrective action even before substandard performances do occur (refer table 6.3 (h)).



## **b) Categorise the deviations**

All deviations should be categorised into those that:

- i) should be corrected immediately,
- ii) could be managed,
- iii) could be corrected later,
- iv) should be classified into tolerances, and
- v) should be classified into exceptions.

## **c) Specify control schedules**

Work in progress and completed should be regularly inspected on a predetermined authorised schedule of accountability in order to ensure that equipment are inspected timeously. Inspections of underground workings are statutory compulsory. All inspection schedules should be determined and compiled during the task and resources analysis (refer table 6.3 (g) and 6.3 (h)).

### **6.2.3.2 Evaluate the performance**

The deviations should be used and evaluated in order to:

- a) compare actual results against performance standards,
- b) establish the magnitude of the deviations,
- c) correct the deviations, and
- d) specify the deviations into tolerances or exceptions.

### **6.2.3.3 Correct the deviations**

All deviations must be corrected as soon as is practically possible. The occurrence of deviations could be limited by adequate training so that the minimum deviations from the actions would occur.

Where and when deviations do occur the operator and supervisor should:

- a) determine the impacts of each deviation,
- b) establish priorities,
- c) compile corrective plans,
- d) implement the plans, and
- e) control the progress and results with the corrective action plans.

### **6.2.4 Compile the written plan**

All plans from the operator level to the top level must be integrated, computerised and converted into written plans. They should be utilised for control and record purposes.

The written plans should, where applicable state the:

- 6.2.4.1 vision of the organisation if preferred,
- 6.2.4.2 mission of the organisation if preferred,
- 6.2.4.3 strategy and main objective of the plan,
- 6.2.4.4 results required and the objective to be realised,
- 6.2.4.5 development of the work flow,
- 6.2.4.6 development of the task and resources analysis,
- 6.2.4.7 budget,
- 6.2.4.8 supporting plans,
- 6.2.4.9 assumptions made during planning for each decision, and
- 6.2.4.10 detail required for sound decisionmaking, record keeping and history in the future.

### 6.3 PRACTICAL EXAMPLE

It is normal practice that during the development of the main underground accesses to new production areas, the ventilation airways that would serve the production areas need to be prepared. These airways would have to handle the ventilation flow to and from the production areas for the life of that specific reserve block which could be several years. The proven method is to build strong air leakage-proof brick walls (stoppings) to serve as partitions between the fresh and foul airways during the development and during the future operational stages of the accesses. One of the miner's tasks is to develop and prepare these accesses.

The miner has, as part of his team, some workers who are also trained to build the brick walls (refer figure 6.4 (e) task indicated with the red arrow). Normally one brick wall has to be build per day shift. He has different alternatives in order to make these walls available. He could contract it out or build it himself. The miner would build the wall with the labour provided in his team.

The results required could be stated as follows:

- Brick wall = 1,
- Height = 4 m,
- Width = 6 m,
- Thickness = 0.220 m,
- Maximum time allowed  $\leq$  6 hrs,
- Total cost  $\leq$  R5 500,
- Accidents = Nil, and
- Damages = Nil.

The objective could be formulated as follows:

To deliver the required brick wall in an effective production shift of six hours safely and economically.

The best alternative to build the wall is developed into the following three main tasks:

- Supply mortar,
- Provide bricks, and
- Place the bricks.

The requirement to have the specific brick wall completed and available at the end of the shift as specified in the results required would entail that this task must be developed by applying the rules as discussed up to this point. In practice the complete development of this task would entail many pages and detail. In the context of developing this thesis it would result in a large increase of volume of the document. It was therefore decided to use a very direct and simple line of approach in the application of the rules. A single vertical line of development was consequently applied (refer table 6.7).

The work flow is developed in sequence as follows:

- the first main task to supply mortar,
- the first supporting task of the main task to measure components,
- the first controlling task of the supporting task to place measuring flask, and
- the first supplementary task of the controlling task to mark the position,

The manner in which this line was developed would also be applicable to the rest of the other identified tasks (refer figure 6.5 (a) to figure 6.5 (d)). The other identified tasks would be developed similarly in a logical sequence up to the last task as indicated by the arrows in red (refer figure 6.5 (a) to figure 6.5 (d) and table 6.7). The other tasks would be developed similarly up to the smallest task and resource necessary. These tasks would then form the basis for the development of the task and resources analysis.

The task and resources analysis in turn would establish the basis for the codification of tasks and items, the determination of the time duration, capital and running costs of the tasks, hazard analysis, development of policies, budget, procedures, training schedules and supervisory and control schedules. Once the task and resources analyses had been completed the plan can be summarised, coordinated and integrated upwards into the total plan per employee, section, department and organisation as a whole (refer table 6.8 and figure 6.6). In the development of the work flow to build a brick wall it is proved that the procedure as outlined in section 6.2.1.3 (b) is strictly applied. It is also clear that the development diagrams comply with the logic of the comprehensive, practical and integrated management method.

From figure 6.5 (a) to figure 6.5 (d) it can be seen that:

- the results required for each task are specified,
- the results required for the the main tasks to build a brick wall add up to the sum of results required to build the brick wall,
- the objective for each task is formulated, and
- all objectives support the realisation of the main objective.

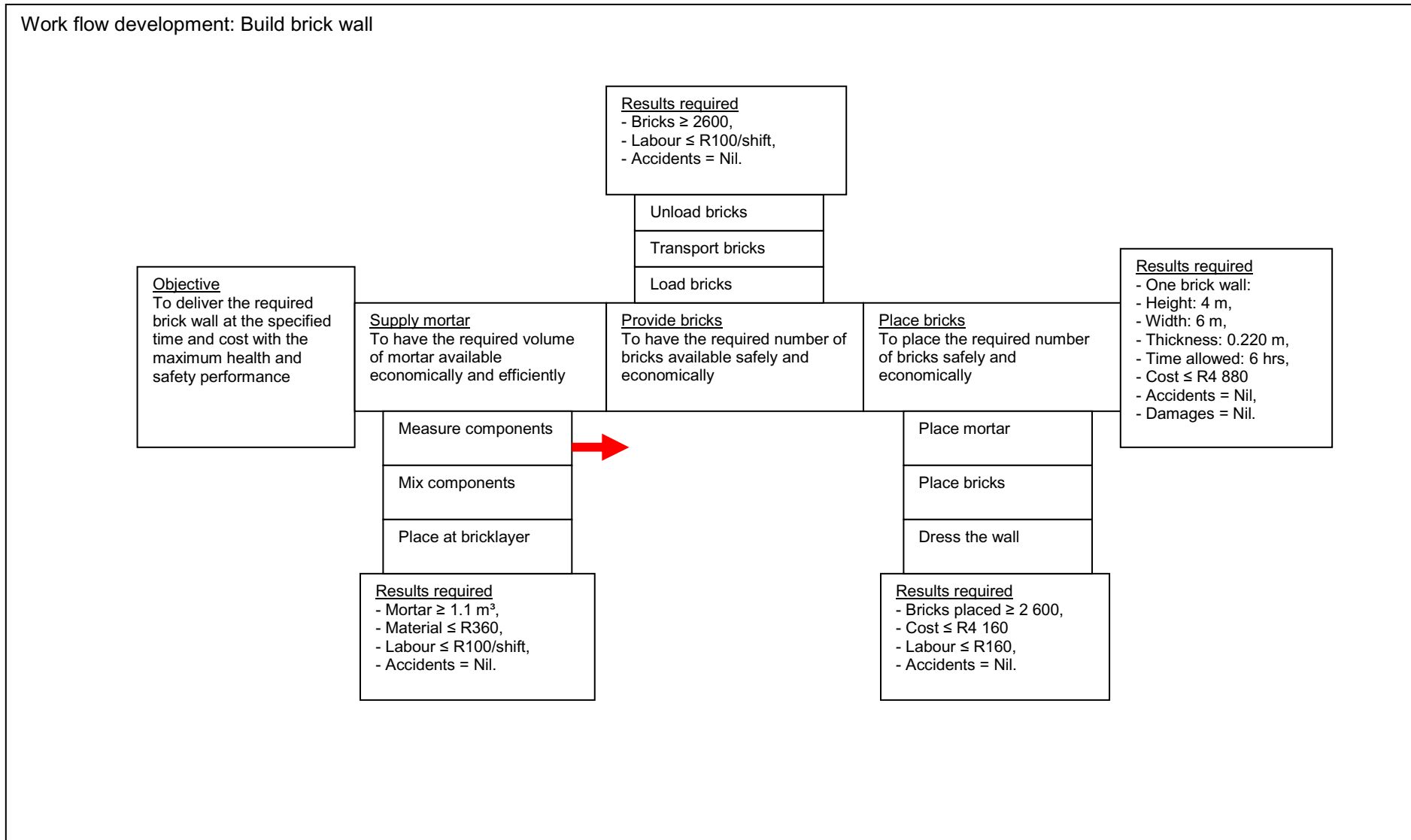


Figure 6.5 (a): Work flow development to build a brick wall

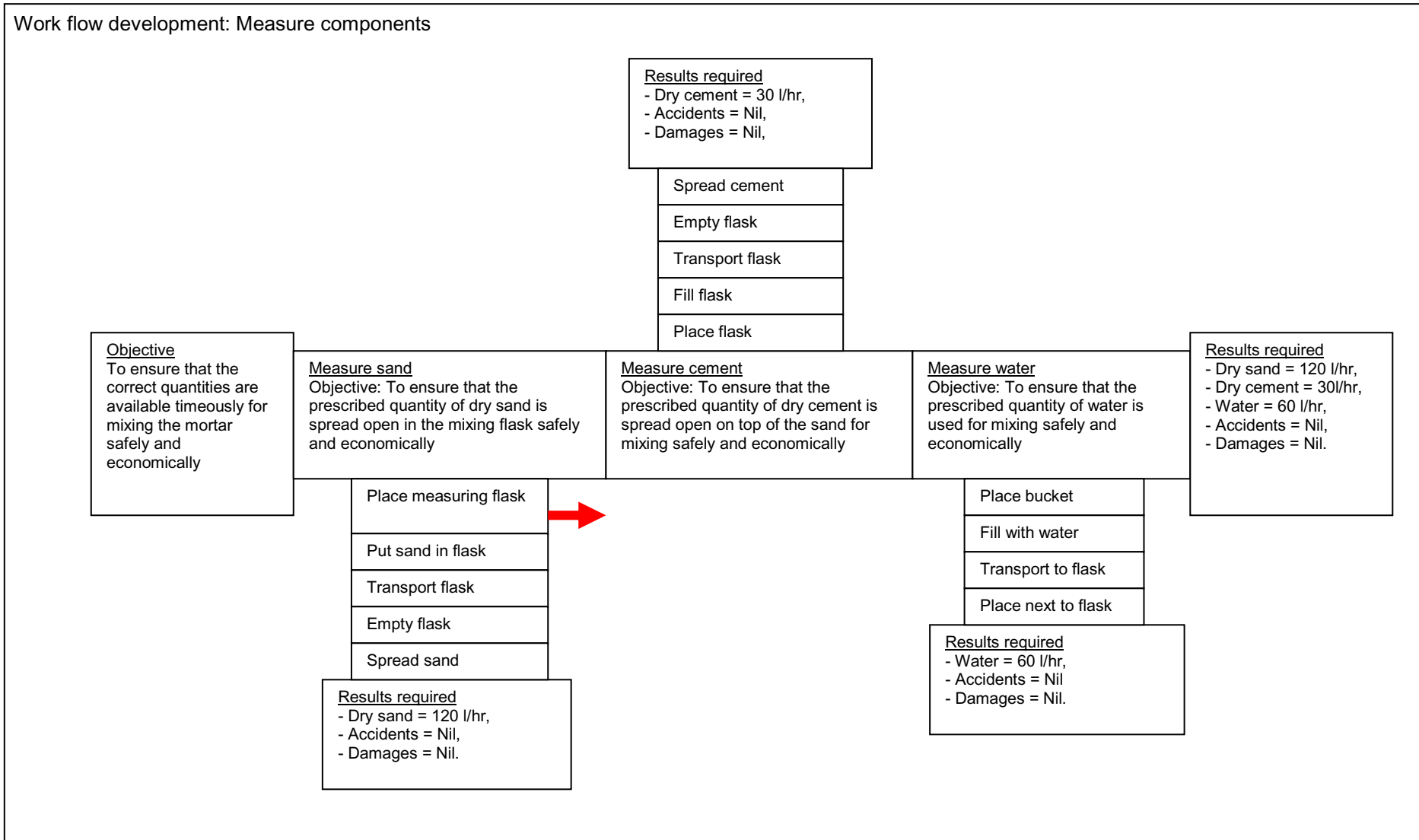


Figure 6.5 (b): Work flow development of the task to measure components

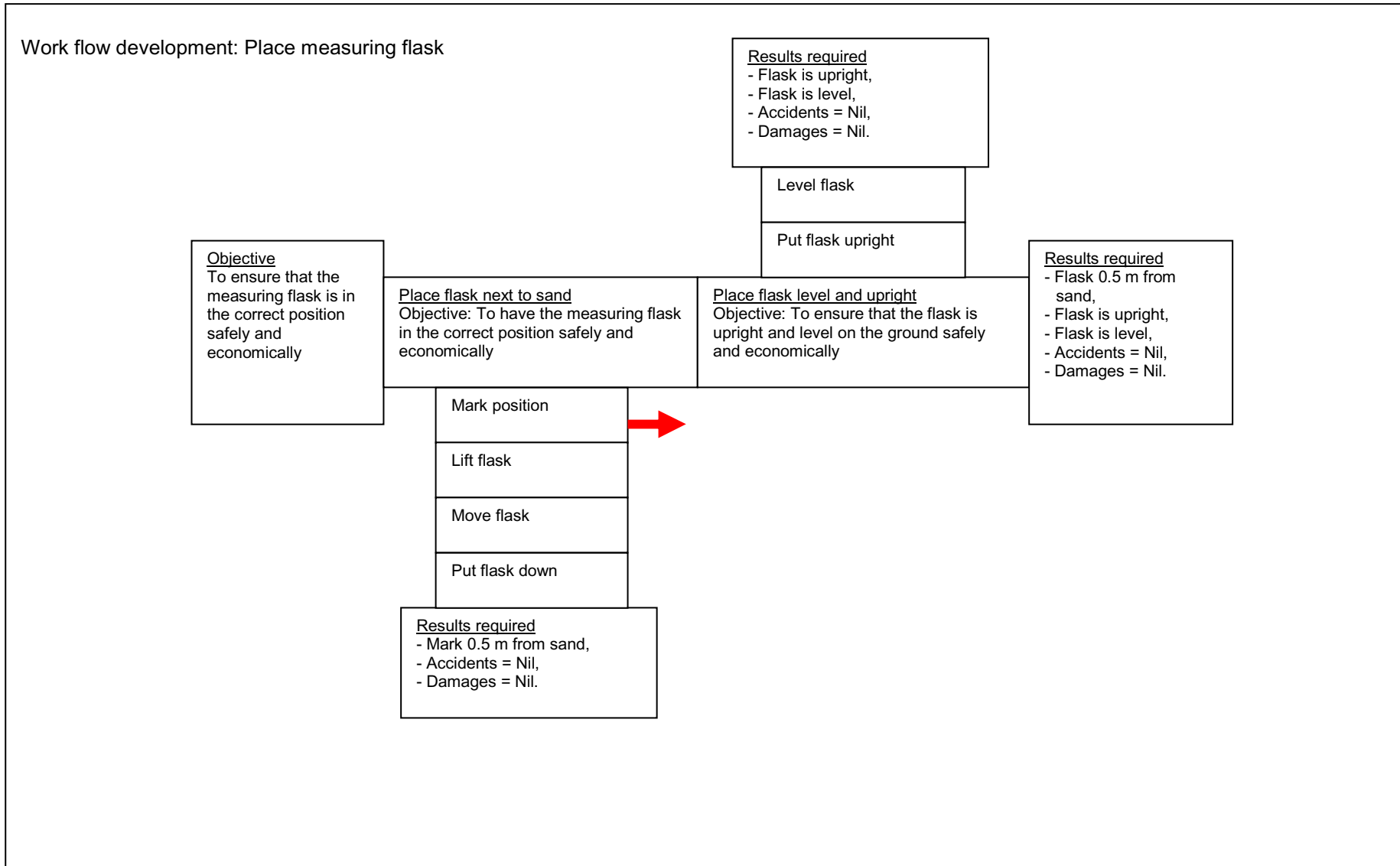


Figure 6.5(c): Work flow development of the task to place the measuring flask

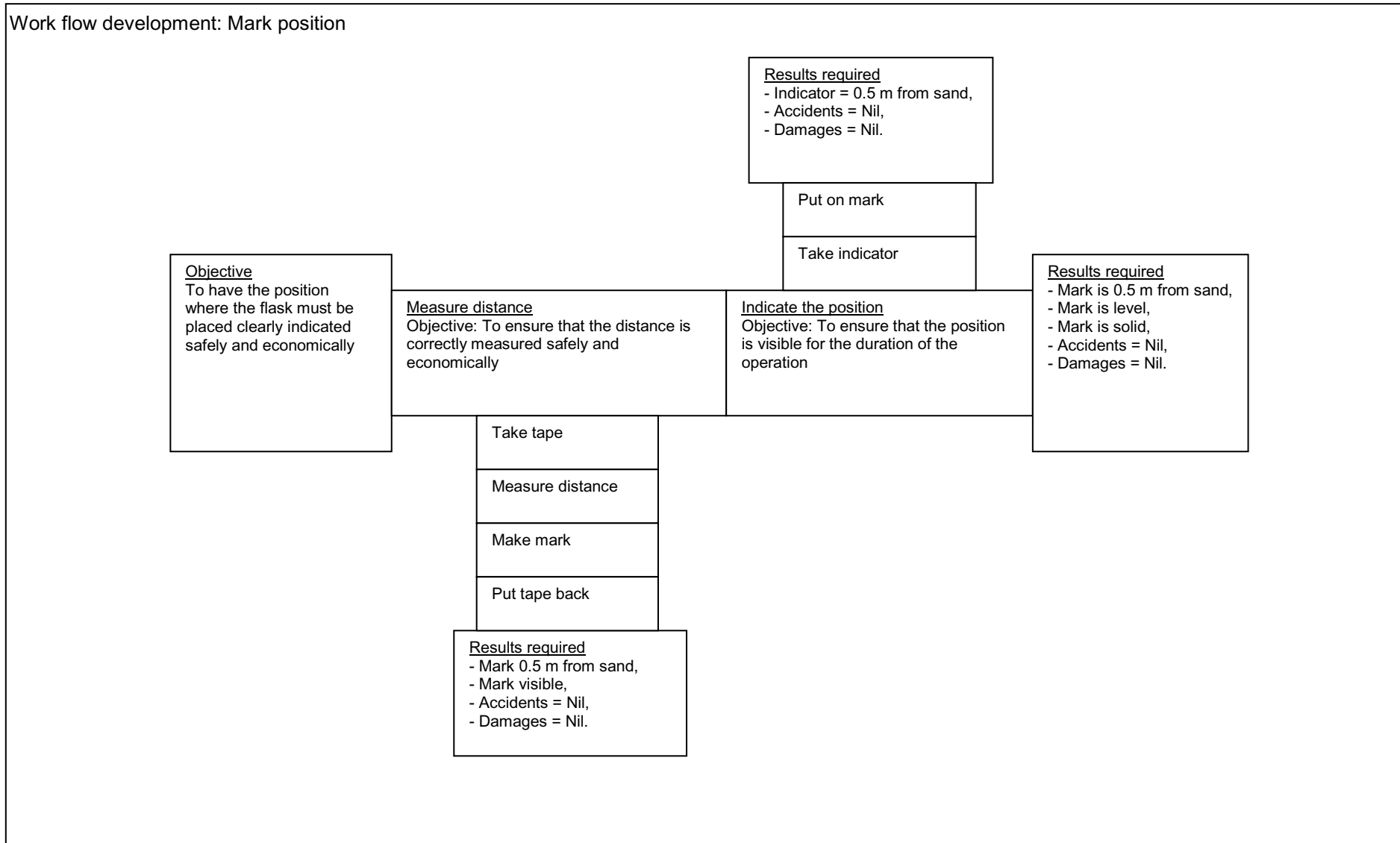


Figure 6.5 (d): Work flow development of the task to mark the position

The task and resources analysis would be compiled commencing with the last task of figure 6.5 (d) in this example. It should be realised that this exercise mainly serves to explain the application of the procedure to apply the comprehensive, practical and integrated management theory and is by no means intended to be complete.

The task and resources analysis would have to be developed in the following sequence (refer figure 6.5 (d) and table 6.4 (a) to 6.4 (h)):

- take indicator, and
- put on mark.

The total of the two tasks would represent the components of the task to indicate the position.

The next step of the task and resources development would be to develop the following tasks in the sequence as depicted below (refer figure 6.5 (d) and table 6.5 (a) to 6.5 (h)):

- take tape,
- measure distance,
- make mark, and
- put tape back.

The total of the four tasks represents the components of the task to measure the distance. In practice each of these tasks would be further developed into the smallest tasks practically feasible. All the required resources would be developed into the smallest components practical. The total of the tasks to measure the distance and indicate the position equals the tasks of the work mark the position. In this sequence the tasks to build a brick wall can be developed (refer figure 6.5 (d) and table 6.6 (a).to 6.6 (h)).

The comprehensive management logic makes it feasible to:

- develop work into the smallest tasks practically feasible,
- summarise tasks into jobs realising a specific objective,
- group jobs into posts and group posts into sections and departments,
- develop the most logical and practical organisational structure,
- identify and rectify the smallest risks,
- identify and rectify the smallest deficiencies or threats to performance and safety,
- compile the necessary procedures in order to efficiently manage operations,
- develop the required task-specific supervision methods and schedules,
- develop and institute effective reporting systems,
- develop a comprehensive, practical and integrated plan for each employee and the organisation as a whole, and
- computerise all the plans.





2.1		2.2					2.3		
Labour		Equipment					Time		
2.1.1	2.1.2	2.2.1	2.2.2	2.2.3	2.2.4	2.2.5	2.3.1	2.3.2	2.3.3
Number	Cost	Type	Number	Capacity	Capt. Cost	Unit cost	Start	Finish	Duration
	R0.0232	Indicator	1	200 x 200 mm <sup>2</sup>	R45.00		08:00	08:05	0:05
	R0.0232						08:05	08:10	0:05
	R0.0464	Indicator	1		R45.00		08:00	08:10	00:10

Table 6.4 (b): Task and resources analysis sheet of the task to indicate the position















1. Task identification: Measure distance			
1.1	1.2	1.3	1.4
Code	Task	Performance Standards	Objectives
	Take tape	<ul style="list-style-type: none"> <li>• Tape in right hand</li> <li>• The correct length tape</li> <li>• Tape held firm</li> </ul>	To get hold of the measuring tape efficiently, cost effective and safely
	Measure distance	<ul style="list-style-type: none"> <li>• Distance of 0.5 meter</li> </ul>	To have the flask put in the correct position
	Make mark	<ul style="list-style-type: none"> <li>• Mark 0.5 meters from sand</li> <li>• Mark clearly visible</li> </ul>	To indicate the correct position clearly
	Put tape back	<ul style="list-style-type: none"> <li>• Tape in belt pouch</li> </ul>	To keep the tape safe
Summary			

**Table 6.5 (a): Task and resources analysis sheet of the task to measure the distance**

2. Resources									
2.1		2.2					2.3		
Labour		Equipment					Time		
2.1.1	2.1.2	2.2.1	2.2.2	2.2.3	2.2.4	2.2.5	2.3.1	2.3.2	2.3.3
Number	Cost	Type	Number	Capacity	Capt	Unit	Start	Finish	Duration
	R0.023	Measuring tape	1	5 meter length	R85.00		08:00:11	08:00:15	00:00:05
	R0.023	Measuring tape	1	5 meter length	R85.00		08:00:16	08:00:20	00:00:05
	R0.023	Marking rod	1	0.30 mm x 12 mm	R12:00		08:00:21	08: 00:25	00:00:05
	R0.023	Belt pouch	1	80 x 80 x 50 mm	R25		08:00:26	08:00:30	00:00:05
	R0.092	Measuring tape	1	5 meter length	R122.00		00:00:11	08:00:30	00:00:20
		Marking rod	1	0.30 mm x 12 mm					
		Belt pouch		80 x 80 x 50 mm					
			3						00:00:20

**Table 6.5 (b): Task and resources analysis sheet of the task to measure the distance**

3. Performance	
3.1	3.2
Possible Deviations	Possible Consequences
Could have taken it with wrong hand	<ul style="list-style-type: none"> <li>Carelessness</li> <li>Lack of adequate training</li> </ul>
	<ul style="list-style-type: none"> <li></li> </ul>
Could over measure	<ul style="list-style-type: none"> <li>Would increase distance</li> <li>Increase in time</li> </ul>
Mark not 0.5 meter from sand	<ul style="list-style-type: none"> <li>Would increase istance</li> <li>Increased time duration</li> <li>Retard task</li> <li></li> </ul>
Mark not clearly visible	<ul style="list-style-type: none"> <li>Worker might not see it</li> <li>Might offload too far</li> </ul>
Did not put tape in pouch	Might loose tape

**Table 6.5 (c): Task and resources analysis sheet of the task to measure the distance**



5. Risk assessment			
5.1	5.2	5.3	5.4
Probability (P)	Severity (S)	Rating (R)	Type (T)
5	2	4	P
4	6	5	P
4	5	4	P
4	4	4	P
4	6	5	p

Table 6.5 (e): Task and resources analysis sheet of the task to measure the distance





8. Reporting		
8.1	8.2	8.3
Accountability	Frequency	Type
Miner	Once per shift	Miner's shift report
Miner	Once per shift	Miner's shift report
Miner	Once per shift	Miner's shift report
Miner	Once per shift	Miner's shift report

Table 6.5 (h): Task and resources analysis sheet of the task to measure the distance





2. Resources									
2.1		2.2					2.3		
Labour		Equipment					Time		
2.1.1	2.1.2	2.2.1	2.2.2	2.2.3	2.2.4	2.2.5	2.3.1	2.3.2	2.3.3
Number	Cost	Type	Number	Capacity	Capt cost	Unit cost	Start	Finish	Duration
	R0.0926	Measuring tape	1	5 meter long	R85.00		08:00:10	08:00:30	00:00:20
		Marking rod	1	300 x 12 mm	R12.00				
		Belt pouch	1	80 x 80 x50 mm	R25.00				
	R0.0463	Indicator	1	200 x 200 mm <sup>2</sup>	R45.00		08:00:00	08:00:10	00:00:10
		1 Measuring tape			R85.00		08:00:00	08:00:30	08:00:30
		1 Marking rod			R12.00				
		1 Belt pouch			R25.00				
		1 Indicator			R45.00				
	R0.1389		4		R167.00				00:00:30

Table 6.6 (b): Task and resources analysis sheet of the task to mark the position







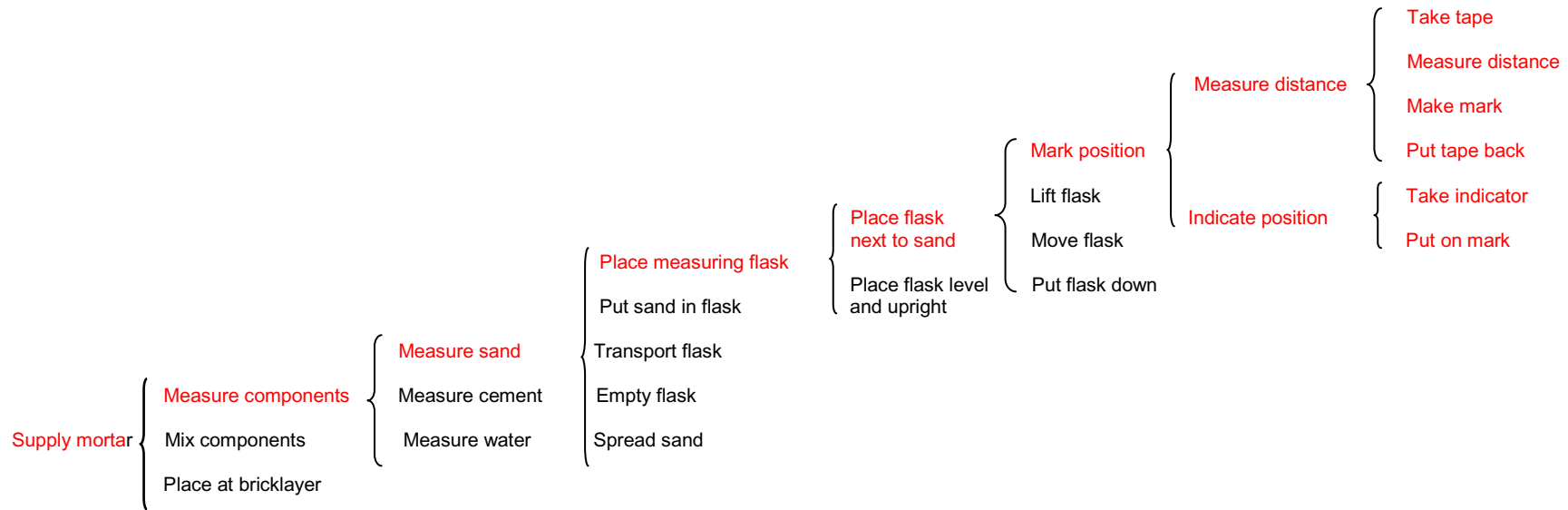




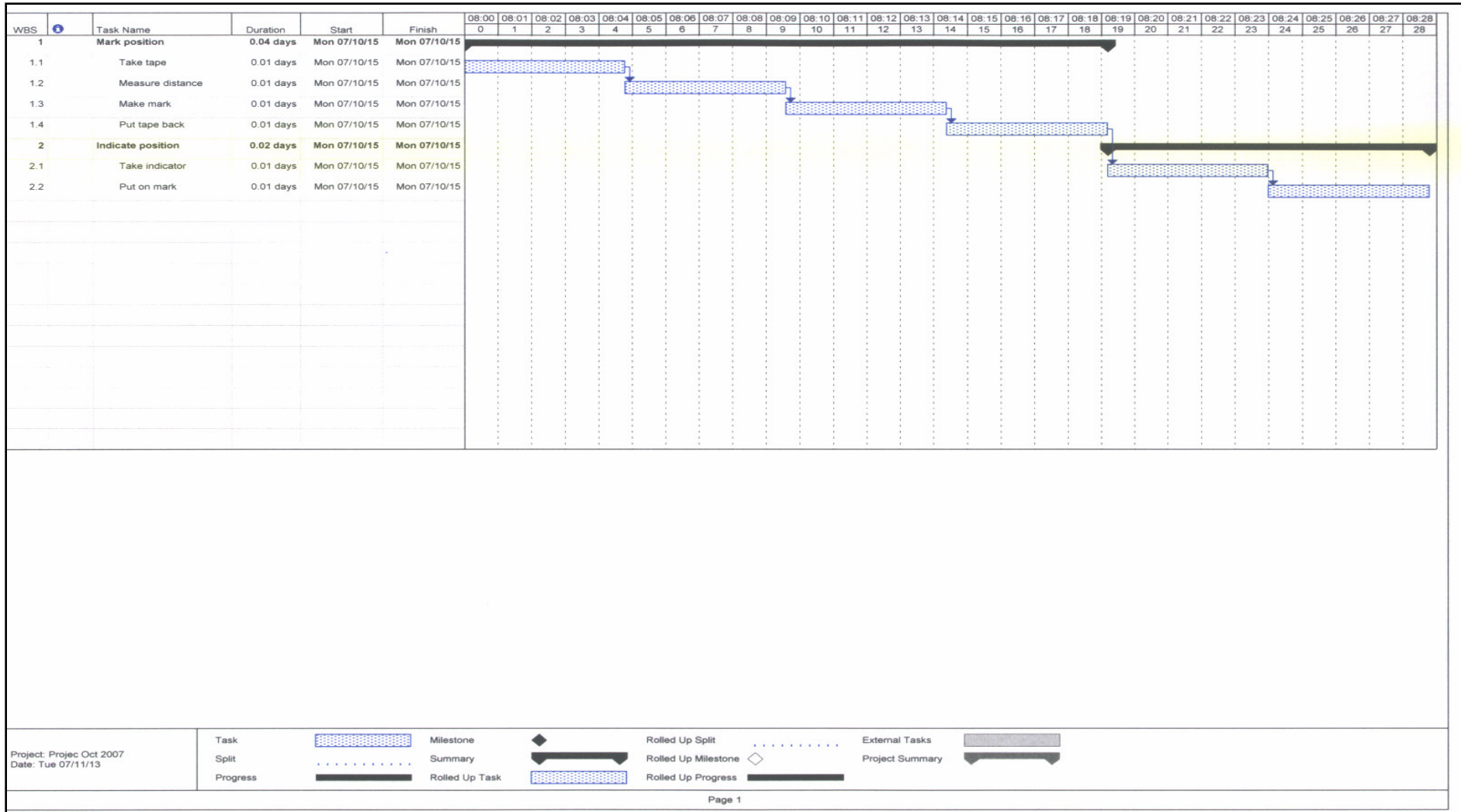




Build a bickwall



**Table 6.7: Schematic flow diagram of work flow development and task and resources analysis  
(refer figure 6.5 (a) – 6.5 (d) and table 6.4 (a) - 6.6 (h))**

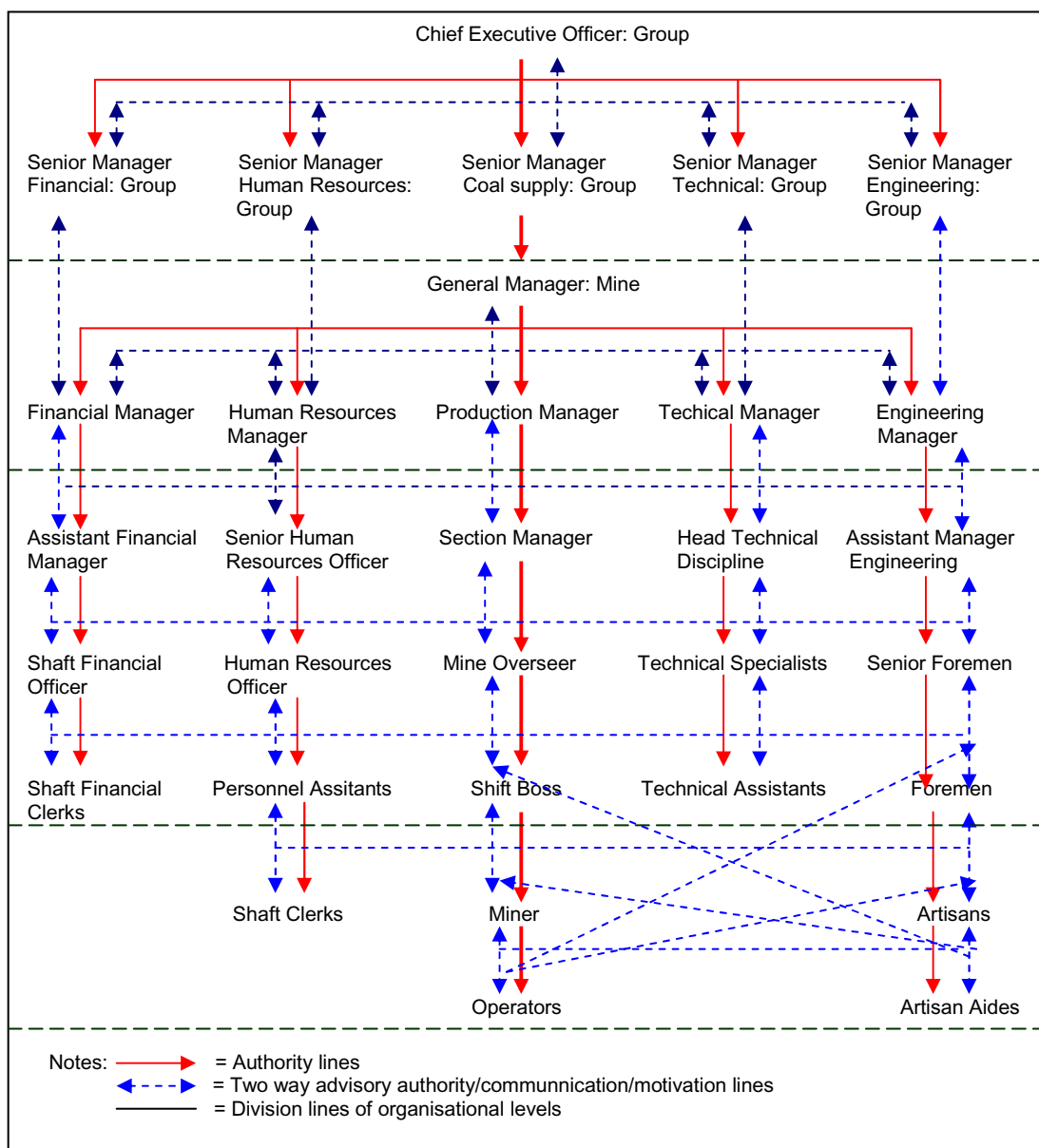


**Table 6.8: Schedule of the work flow and task and resources analysis**

## 6.4 IMPLEMENTATION OF THE METHOD

Training in the theory should immediately be followed by the implementation of it in the employee's specific work situation according to the proposed procedure (refer section 5.3, 5.4, 5.5 and 5.6). Initially the theory would be implemented from the top starting with the Chief Executive Officer and going right down to the last level employees.

The work flow diagrams of the supervisors need only to be developed up to the controlling tasks since that would enable the supervisor to determine the results required from him, the performance standards for each task and the objectives. It would enable him to delegate efficiently to each immediate subordinate and stakeholder and to control the work in progress or performed.



**Figure 6.6: Typical mine organisational structure showing authority, advisory and communication lines**

Each employee must strictly apply the procedure developed in this chapter (refer section 6.2.1). For the implementation of this management method the following procedure should be followed:

6.4.1 Management should ensure that all employees in the organisation, from the top down to the bottom levels, are thoroughly developed in the theory of the comprehensive, practical and integrated management method and trained to apply the proposed procedure. It would require that:

6.4.1.1 management should be the first to be trained and developed,

6.4.1.2 the development and training are cascaded down from the top to the bottom levels,  
and

6.4.1.3 supervisors must preferably present the development and training programs themselves to their immediate subordinates.

6.4.2 In the first phase the supervisory levels must only:

6.4.2.1 compile the work flow up to the controlling tasks,

6.4.2.2 complete the task and resources analysis for those tasks that they have to perform themselves to the end,

6.4.2.3 apply the procedure up to the compilation of the task and resources analysis, and

6.4.2.4 then delegate for the results required from their immediate subordinates.

6.4.3 At the operator level:

6.4.3.1 the procedure must be applied from the beginning to the end,

6.4.3.2 the work flow must be completed down to the smallest tasks,

6.4.3.3 the task and resources analysis must be completed in the necessary detail, and

6.4.3.4 at the completion of the task and resources analysis the operators must submit their plans to their immediate supervisors.

6.4.4 The immediate supervisors must then:

6.4.4.1 incorporate the plans of their subordinates, where applicable into their own plans,

6.4.4.2 liaise with the relevant stakeholders, and

6.4.4.3 adjust their plans where required.

6.4.5 Each successive supervisor must:

6.4.5.1 incorporate the plans of their subordinates, where applicable into their plans,

6.4.5.2 liaise with the relevant stakeholders, and

6.4.5.3 adjust their plans where required.

6.4.6 This process must continue up to the mine/general manager of the mine who must:

6.4.6.1 discuss the results with the senior manager in head office,

6.4.6.2 the senior manager would discuss the results with the board , and

6.4.6.3 feed any changes, adjustments or approval back to the mine/general manager.

6.4.7 The mine/general manager should:

- 6.4.7.1 discuss any changes from head office with his immediate subordinates,
- 6.4.7.2 ensure that changes, if any, be made and fed down to the next level, and
- 6.4.7.3 ensure that this process continues down to the lowest levels.

6.4.8 The plan should be:

- 6.4.8.1 finalised from the bottom up, and
- 6.4.8.2 summarised at the top into the plan for the mine as a whole.

6.4.9 At each level:

- 6.4.9.1 the best method to achieve the most optimum results with a specific task must be determined and used to further develop the work flow,
- 6.4.9.2 the tasks must be coordinated and integrated and scheduled,
- 6.4.9.3 critical paths must be compiled and optimised, and
- 6.4.9.4 communication, coordination and integration must commence with the top level down to the last levels and again upwards to the top level.

6.4.10 The planning structure should:

- 6.4.10.1 contain all the necessary term plans for each level,
- 6.4.10.2 enable each employee at each level of the organisation to compile and to have his own plan, and
- 6.4.10.3 completely facilitate the adjustment, modification or discarding of plans whenever changes do occur.

## 6.5 CONCLUSION

The comprehensive, practical and integrated management method consists of the theory and the procedure to implement it. The theory was developed in chapter 5 and in this chapter the procedure to implement the theory was developed (refer sections 1.5.2.8, 1.5.2.9, 5.4 and 6.2).

The implementation of the theory would require that all employees on all the levels of the organisation should at all times conscientiously and meticulously follow the steps proposed in this procedure. With adequate training and development in the theory and procedure to apply it each employee in the organisation would be empowered to fully manage for the efficient achievement of the results required from each of them.

The implementation of this management method would ensure that:

- 6.5.1 management is completely integrated on all levels by all employees under all circumstances,
- 6.5.2 no necessary or the minimum work is omitted,

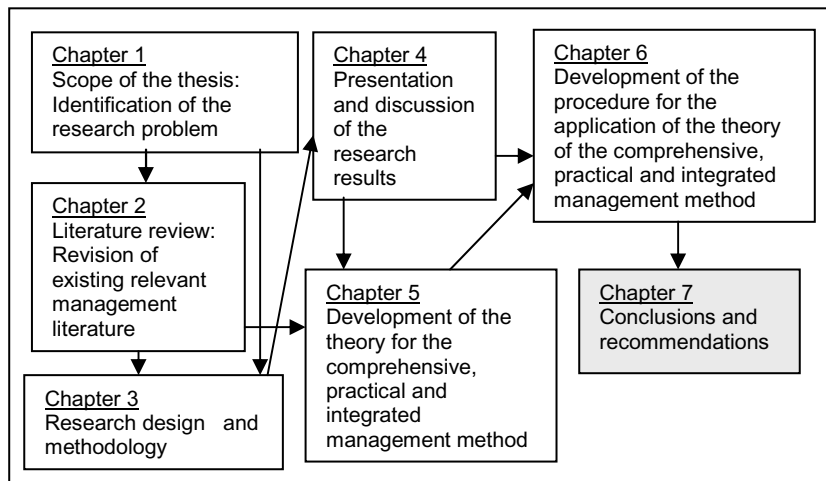
- 6.5.3. each and every employee would find a place in the organisation for him that would make him feel wanted, important and useful to the realisation of the company's objectives and thereby the insurance of a sustainable future for him and his family,
- 6.5.4 every employee would be sufficiently competent to efficiently manage for the the results required from him,
- 6.5.5 the results of every employee and the organisation would be that as planned,
- 6.5.6 the formulated objectives would support the main or general objective of the organisation,
- 6.5.7 work could be logically developed into the finest detail,
- 6.5.8 the standards for control would be developed as part of the development of the work flow,
- 6.5.9 complete integration and coordination would be achieved,
- 6.5.10 all necessary risks, policies, procedures and reporting systems are developed simultaneously with the planning of the work,
- 6.5.11 the industry would be able to optimise the given mineral resources,
- 6.5.12 all management work could be computerized,
- 6.5.13 all employees would be fully empowered at all times,
- 6.5.14 the costs of management development practices in the mining industry would be optimised,
- 6.5.15 all operations could be continuously optimised,
- 6.5.16 the mining industry would be able to regain its global leading position,
- 656.17 the industry would be able to maintain its desired competitive edge,
- 6.5.18 the industry would be able to expand, and
- 6.5.19 the following management work is enhanced:
- efficient decision making,
  - efficient communication,
  - motivation of employees,
  - empowerment of employees,
  - development of recruiting specifications,
  - recruitment and appointment of the most potential workers,
  - development of training and development procedures,
  - training and development of employees,
  - exercising of effective control for each task and employee on all the levels,, and
  - improving of the overall performance.
- 6.5.20 the management deficiencies identified in the previous chapters could be completely rectified (refer section 2.8, 4.2 and 4.4).

## CHAPTER 7

### CONCLUSIONS AND RECOMMENDATIONS

#### 7.1 INTRODUCTION

In chapter 1 it was pointed out that the South African mining industry provided the stimulus for the extensive development of an efficient physical infrastructure that contributed largely to the development of related secondary industries in the country (refer section 1.1). It played and still continues to play a valuable leadership role in many local and world wide safety and efficiency improvement projects. In recent years serious concern had been expressed with respect to the industry's deteriorating performance in growth, productivity, containment of cost, competitiveness and health and safety in general compared with that of prominent mining concerns in other countries (refer sections 1.2.9.1 and 1.2.9.7).



**Figure 7.1: Chapter 7 in context to the overall thesis**

The main reason for this mediocre performance was identified to be the lower than acceptable management competency in the mining industry. It was regarded as the major cause for the industry's unacceptable poor performance locally and globally (refer section 1.5.2.5, 2.8 and 4.4.15).

It was also proved that existing management practices were not sufficiently comprehensive to enable management to acquire the required managerial competency. It was incomplete and did not comply with the requirements of a comprehensive, practical and integrated management method, the logical classification of management work; a logical planning process and an industry-specific developed planning structure (refer section 2.2.1, 4.4.1, 5.5.4, 5.5.5, 5.6.1 and 5.6.2).

In chapter 5 the comprehensive and integrated management theory was developed. In chapter 6 the procedure to implement this theory was developed and proposed (refer section 5.4 and 6.2). The comprehensive, practical and integrated management theory together with the procedure constitutes the comprehensive, practical and integrated management method which was the topic of this thesis.

The method proved to be scientifically correct and easy to implement on all the levels of any organisation in the South African mining industry (refer section 6.2). It accumulates knowledge, requires competent application of the knowledge, accepts social responsibility, and exercises self-control. It is flexible, adaptable and promotes sound logical reasoning. It is expected to be totally acceptable by the mining community (refer section 2.4.10). This management method is believed to improve the managerial competency of all the mining employees to the proposed competency standard of 85 per cent and beyond (refer section 4.1).

In this chapter the salient features of the thesis would be summarised. An evaluation of the theory and the procedure would be presented. Recommendations to implement the comprehensive, practical and integrated management method in the practical situation would be proposed. Finally some management aspects for further research would be recommended.

## **7.2 RESEARCH RESULTS**

### **7.2.1 Literature review**

The review of the literature was discussed in chapter 2. The main objective was to establish whether a comprehensive, practical and integrated management theory and method could be ascertained from the literature. For the purpose of this thesis comprehensive was defined as inclusive or covering many things or a wide area. A comprehensive, practical and integrated management method, therefore was seen as a management method that would enable all employees, on all the levels, of any organisation to manage comprehensively for the achievement of the results required from them in all required aspects at all times. In section 2.2.1 the requirements of a comprehensive, practical and integrated management method was proposed as perceived at that stage. Evaluated against these perceived requirements it was concluded that existing literature and management practices had a number of deficiencies. The main conclusions arrived at from the literature review are discussed in the following sections.

#### **7.2.1.1 The all-inclusive management theory**

An all-inclusive management theory that would satisfy all the requirements of a comprehensive, practical and integrated management method could not be ascertained from existing management literature and practices. Such a theory therefore did not exist.



Various management authors and theorists confirmed this statement. The views of a number of the most prominent authors on management are briefly summarised below (refer section 1.3).

a) Drucker (1968:41) was of the opinion that:

- what it requires to run a business,
- what management is supposed to do, and
- how it should be doing it, have so far been neglected.

He published many highly valued books on management theory and principles and travelled extensively over the world in pursuit of the establishment of management principles and practices. He was honoured by the Harvard Business School as “The pre-eminent management thinker of our time” (refer section 1.3).

b) Allen (1973:46) argued that a relevant taxonomy or principles of classification would be required in order to meaningfully study management in an orderly and rational fashion. He argued further that the foundation for this had not been laid yet for management. According to him the following requirements would be indispensable to the progress of the management profession:

- a system for sorting, categorising, labelling, and defining new and old management information,
- a commonly understood classification of management work as a tool, and
- a taxonomy that would facilitate the communication and dissemination of new management knowledge and the basis for the logical definition of management terms.

c) Rue and Byars (1989:49) two of the more recent management authors argued that:

- some progress had been made in management development, and
- a unified theory of management had not been realised yet,

d) Callaway (1999:21) for example expressed the opinion that:

- it is in this quest for the one special management technique that will ensure success that had led to the seemingly never-ending supply of management theories,
- each of these, in their own way, contained a grain of truth, yet to date none provided all of the answers, and
- the various theories and techniques could be compared to a series of musical instruments. Each has a unique style and ability, but when taken together and used as part of a larger activity, they develop a synergy that transcends their individual contributions.

e) Drucker (2001:89), more recently after many more years in the management fraternity and the publishing of more valuable work on management, concluded that:

- what is needed is a redefinition of the scope of management, and
- management has to encompass the entire process.

f) Hellriegel et al (2005:8) in their 2005 'international student edition' argued that:

- the manager has to perform the four basic functions of management: planning, organising, leading and controlling – the basic principles of the administrative management approach developed during the 1880s by Henri Fayol, and
- their book was claimed to be totally designed on the most recent knowledge and views about the management discipline and proved, as Drucker and Callaway stated, that the one special management technique still did not exist.

### 7.2.1.2 Current management practices

A large number of management practices were proposed over time. Mostly a combination of these is currently applied in any one organisation at any one point in time.

- a) It would appear, however, that the administrative or process management approach developed by Fayol in the 1880s is still the one management approach that was predominantly being utilised by most management authors and practitioners (refer section 2.6.1). From the empirical research it was established that it is predominantly utilised by the South African mining industry (refer section 4.3.2). More recently Hellriegel et al (2005:8) and McDaniel and Gitman in 2008 published their books with the principles of the administrative management approach as the basis of their discussions.
- b) Existing management theory lacks a management logic or taxonomy for the logical sorting, categorising, labelling, and defining of new and old management information, as Allen termed it (refer section 2.6.2.8). The classification of the existing management theory is not based on a management logic that would allow the complete development of management work. The probability that the organising function, as it is known and applied today, should actually be one of the outcomes of the planning function was not realised, understood and admitted (refer section 5.5.4 and table 5.2). The leading and controlling functions are not really seen as time related functions or specific human skill categories that have to adapt to the development stages of the human race and advancement of technology.
- c) In chapter 2 existing management literature and practices were evaluated against the perceived requirements of a comprehensive, practical and integrated management method (refer section 2.2.1). It was established that with existing management literature and practices these requirements would not be completely met (refer section 2.8). The following were identified as the main deficiencies.
- It was impossible to integrate and coordinate the four functions of the administrative management approach in practice by all employees on all the levels of the organisation (refer section 2.8.1). A comprehensive, practical and integrated management method that complies with these requirements did not exist (refer section 1.5.1, 2.8.1 and 2.8.3),

- Existing management theories individually or combined appeared to be inadequate to develop the theory for a comprehensive, practical and integrated management method (refer section 1.5.2.2, 2.8.4, 5.3.8 and table 5.1).
- The managerial competencies of management are unacceptably low. It would appear that some components of the existing management theories and practices could totally or to some extent or in combinations be modified and utilised to develop the theory for a comprehensive, practical and integrated management method (refer section 1.5.2.6 and table 5.1).
- Existing planning processes and structures are totally inadequate to enable management to plan comprehensively on an integrated basis on all the levels of the organisation (refer section 1.5.2.3, 2.8.5, 5.6.1 and 5.6.2),
- Existing management practices are inadequate to enable managers and employees to comprehensively perform the steps as set out in section 2.8.8 (refer section 2.8.8.1 to 2.8.8.26). It would also be impossible to efficiently perform the tasks of the managerial skills (refer section 2.8.10.1 to 2.8.10.11).
- The additional required management theory to develop a comprehensive, practical and integrated management method and procedure to implement it was developed in chapters 5 and 6 (refer section 1.5.2.7, 5.4 and 6.2).

## **7.2.2 Empirical research**

### **7.2.2.1 The research design**

The required data was developed in order to enable the researcher to:

- investigate,
- analyse,
- evaluate the state of existing management practices, planning processes, management deficiencies, the knowledge and competencies of management, and
- evaluate the efficiency of the Mine Manager's Certificate of Competency (MMCoC) and the general management qualification in the mining industry with respect to the requirements of the comprehensive, practical and integrated management method (refer section 2.2.1 and 2.8).

The gathering of the data concentrated mainly on the eight mineral sectors that constituted the main business of the South African mining industry (refer section 1.2.4, 3.6 and table 1.1). The responses from the other mineral sectors were grouped under the category 'other'. The sampling covered the geographical areas of the Western Cape Province, Northern Cape Province, Free State Province, North Western Province, Limpopo Province, Gauteng Province, Mpumalanga Province and the Kwa-Zulu Natal Province of the Republic of South Africa. From previous research it was experienced that respondents generally were inclined to rate their managerial knowledge and competencies much higher than what they actually were (refer section 4.4.15, 4.4.16 and 4.4.2.17). Because of this probability a purposive sample was designed and applied on the total sample population whilst the

simple random sample design was designed and applied on a random selected number of the sample population (refer section 3.7.1 and 3.7.2).

Two questionnaires, consisting of 30 questions each were designed and used. One questionnaire was for the management members who were the holders of the Mine Manager's Certificate of Competency and the other one for the graduated managers (refer section 3.8.2 and appendices 7 and 8).

The assessments of these selected random population respondents were discussed with each separately in order to establish a more realistic assessment. The difference, expressed as a percentage, between the respondents' and the researcher's assessments was accepted as representative of the managerial competency gap of the sample.

The management levels were selected because:

- the population was available,
- the potential respondents generally have access to electronic communication media,
- each potential respondent had to succeed specific prescribed management training,
- each potential respondent was or was exposed to management responsibilities, and
- it would be more practical to contact respondents where and when required.

Of these respondents it was required to indicate to what extent the management theory of the Mine Manager's Certificate of Competency, enabled them to efficiently perform the management work required in their managerial positions. Each respondent had to indicate whether or not the management approach that he and the mine utilised mainly consists of the management functions of planning, organising, leading and controlling, and briefly specify and describe the approach that he and the mine utilises in the event that the approach specified above was not utilised. The assessment scale proposed in section 3.8.3.1 was utilised (refer section 3.8.2.1 and 3.8.2.2).

As the questions and responses were expected to be to a large extent subjective it was deemed more practical to make use of an assessment scale that could most efficiently accommodate subjectivity. The proposed scale was designed to be easy to use and to enable the researcher to arrive at acceptable reliable conclusions and judgments (refer section 3.8.3).

In order to test the suitability of these questionnaires a pilot study was carried out. A number of member names were selected at random and used in the pilot study. A return rate of 77.8 per cent was achieved. This rate was deemed to be acceptable (refer section 3.8.5 and table 3.2). The questionnaires were therefore used in the study. In order to facilitate the evaluation procedure relevant assessment criteria were suggested for each question during the personal discussions (refer section 3.8.7.1 and table 3.3). The criteria were used by the researcher to conduct a meaningful and structured interview with each selected respondent. This procedure ensured a more reliable, uniform and representative and meaningful assessment of the respondent's understanding of a comprehensive, practical and integrated management theory

Out of a total number of 135 criteria 80 criteria were with respect to the planning function (refer table 3.4). It confirmed that the criteria of the planning function (59.26 %) comprised the majority of the criteria of the four management functions. This indicated to what extent the planning function formed part of management work at present (refer section 2.6.2.1 and table 3.3 and 3.4).

Since the method of e-mailing questionnaires was considered to be cheap, fast, reliable, facilitating the electronic processing of the completed questionnaires and the acceptable statistical analysis and evaluation of the data it was used (refer section 3.9.2). It would in addition enhance the quick clarification of possible ambiguities and queries with regard to specific questions (Kothari, 1990:22). The questionnaires were e-mailed to all available registered members of the South African Colliery Managers Association, Association of Mine Managers of South Africa and the Northern Cape Mine Managers Association.

For purposes of assessment a competency standard of 85 per cent was proposed. Management competency was defined as the degree of proficiency of any employee in understanding and applying the perceived comprehensive, practical and integrated management theory in his own practical work situation.

#### **7.2.2.2 The research results**

Out of the 245 questionnaires e-mailed a total of 164 (66.94 per cent) responses were received within the planned period of October 2004 to April 2005 (refer table 4.1). From these responses the following specific deficiencies and suggestions with respect to existing management practices being utilised in the South African mining industry were raised (refer section 4.2).

##### **a) Management programs**

The general responses were that:

- Management endeavoured to accommodate managerial needs mainly by short duration, single-topic management programs of which many were not entirely based on management theory, not practical to implement and caused considerable confusion and resistance by the employees.
- These programs were not comprehensive and were mostly intended for line management only.
- The administrative management approach was not comprehensive and practically applicable as a comprehensive, practical and integrated management method.

##### **b) Management planning**

The main deficiencies with existing management planning practices, processes and structures were that they were not complete, logical, integrated and comprehensive enough with the results that:

- Comprehensive management planning practices, processes and structures did not exist,

- Very few of the employees in the organisation were involved in the planning of the results required from each of them.
- Insufficient time and method studies and logical step by step breakdown and analyses of work tasks were performed by the responsible employees in any of the mining organisations.
- Workers were not trained and allowed to set the standards applicable to their own work themselves. Performance standards for employees were normally set by top management and the technical departments.
- Budgets were mostly updated and escalated versions from the previous year with the result that employees did not sufficiently know and understand the objectives and results required from each of them.
- Risk assessments were performed by a separate dedicated department, mostly on an ad hoc basis or because of special requests.

### **c) Management organising**

The main deficiencies with management organising were that:

- Organisational structures could not be scientifically designed because a logical scientific theory and method to develop organisational structures did not exist with the result that existing organisational structures were mainly carry-overs from other similar organisations.
- It was not possible to develop job descriptions correctly with existing management approaches with the result that relationships were inadequately determined and developed. It was almost impossible to delegate efficiently.
- Very few employees understood what coordination meant, what it implied and how it should be affected.

### **d) Management leading**

The main deficiencies with management leading were that:

- Existing management practices largely ignored leadership theories because leadership programs were presented on an ad hoc basis only,
- As a result of the incomplete organisational development communication, delegation, motivation and decision-making were inadequate.

### **e) Management controlling**

The main deficiencies with management controlling were that:

- Performance levels were seldom established and the performance standards were determined for each level of the organisation by dedicated staff departments from the top down.
- Management seldom controlled by exception, however, physical controlling methods on the lower levels were strict and generally regarded as of a high standard.

#### **f) The Mine Managers' Certificate of Competency**

The main deficiencies with the Mine Manager's Certificate of Competency were that it:

- Was out dated and too technically orientated.
- Did not cover the management and human resources theories adequately.

#### **g) Suggestions proposed by the respondents**

The following main suggestions were proposed by the respondents:

- Update the present Mine Manager's Certificate of Competency.
- Introduce a comprehensive, practical and integrated management method that would fully empower each employee on each level of the organisation to plan, implement and control the work necessary for the results required from him.
- Introduce management development programs for all employees on all the levels of the organisation and develop and maintain the managerial competencies of all the employees on all the levels of the organisation.

#### **h) Conclusions arrived at by the researcher during and after the discussions**

The researcher arrived at the following conclusions:

- The administrative management approach was supported by 96.34 per cent of the respondents. It appeared to be the management approach predominantly being utilised by the mining industry (refer section 4.3.2).
- A comprehensive, practical and integrated management method did not exist in the South African mining industry with the result that planning was not performed on a comprehensive company wide basis according to a specific planning process with all employees fully involved. Action plans could not be adequately integrated and coordinated. Comprehensive efficient planning procedures involving all the employees from the executive level to the worker level on the mines did not exist. Communication, reporting and controlling were in most cases totally inadequate.
- Organisational structures could not be designed and developed scientifically with the existing management practices with the result that delegation of responsibilities and authority were normally inefficiently performed.
- Work flows were seldom performed. Alternative methods to achieve planned results were rarely determined and developed and the best alternative was basically never selected and implemented especially at the lower levels.
- Performance standards as well as risk assessments, mainly for the operational levels, were set and performed by a dedicated staff department from the top down.
- Leading is totally inadequate and is raised as a problem area by all respondents.
- Top management mainly sets policies, procedures and regulations mostly without the necessary involvement of all the people affected by it.



- Job specifications could not be determined scientifically with existing management practices.
- Employees were mainly recruited, selected, appointed and trained by staff departments with no or limited involvement of the relevant supervisors.
- Training and development programs were mostly carry-overs from the past and in many instances not mine specific but general group developed programs.
- Existing management systems did not lend themselves to complete computerisation.

### 7.2.2.3 Evaluation of the sampling results

With the analysis and evaluation of the responses, comments and suggestions from the respondents and the observations by the researcher of the management practices in the mining industry it was established that:

- the administrative management approach was predominantly being utilised in the mining industry (refer section 4.3.2),
- a comprehensive, practical and integrated management method did not exist in the South African mining industry (refer section 2.8.2 and 4.4.2),
- the management practices and programs utilised in the industry were totally inadequate to enable the mining personnel to manage in a comprehensive, practical and integrated manner on all the levels of the organisation (refer section 4.2.2.1 (a) and 4.4.3),
- the Mine Manager's Certificate of Competency was largely outdated and should either be replaced with a comprehensive, practical and integrated management method or be updated (refer section 4.2.2.1 (f) and 4.4.4),
- the planning processes utilised were incomplete and could not enable management to plan comprehensively, practically and in an integrated manner (refer section 2.8.5, 4.2.2.1 (b) (ii) and 4.4.5),
- organisational structures and labour requirements were not scientifically developed and were, in most cases, carry-overs from the past and similar organisations (refer section 4.2.2.1 (c), 4.2.3.5 and 4.6),
- alternative methods and work were seldom developed into tasks with the consequence that the best alternative was not always selected and implemented especially at the lower levels (refer section 4.4.7),
- performance standards and risk assessments were set and performed mainly by staff personnel, who in most cases had inadequate knowledge and experience of the practical operations of the company (refer section 4.2.3.9 and 4.4.8),
- employees were normally told what results were required from them (refer section 4.2.3.4),
- policies, procedures and regulations were seldom instituted and when, mainly by top management (refer section 4.2.3.11 and 4.4.9),
- supervisors were seldom involved in the selection and appointment of their own subordinates. Employees were mainly recruited, selected appointed and trained by staff departments (refer section 4.2.3.14 and 4.2.3.15)),



- job specifications could not be determined scientifically (refer section 4.2.3.13),
- training and development programs were in many cases carry-overs from the past and were in many instances not mine specific but general group programs (refer section 4.2.3.18 and 4.4.14),
- the average measured competency gap of the respondents of the Mine Manager's Certificate of Competency was 62.62 per cent (refer section 4.3.10.1, 4.4.15, figure 4.15 and table 4.13),
- the average measured competency gap of the General Management respondents was 42.19 per cent (refer section 4.3.10.2, 4.4.16, figure 4.16 and table 4.14), and
- the average overall competency gap was 53.94 per cent (refer section 4.3.10.3, 4.4.17, figure 4.17 and table 4.15).

### **7.2.3 Development of the theory**

#### **7.2.3.1 The new developed theory**

A management logic was developed in order to develop the new theory. The comprehensive management logic was based on the premises that management:

- is work,
- predetermines and achieves results,
- is a science and should comply with a specific logical reasoning,
- depends on specific principles of human and organisational needs and behaviour, and
- is a logical process aimed at satisfying specific needs (refer section 5.4 and 5.4.1).

It followed that for the most efficient management:

- performance results required, need to be stated first,
- thereafter the objective should be formulated, and
- then the work or the best method should be determined and efficiently performed.

In section 5.5 it was established that the best method to manage would be to:

- plan,
- implement the plan, and
- control the progress with the plan.

From this logic it followed that the:

- main results required must satisfy the main objective,
- results required for each main task must satisfy the objective of each main task,
- required results would become the standards of performance for that main task, and
- results of all the main tasks must add up to the main results required for the general objective. It must be the total of the results required from each main task.

The advantages of the new theory are that:

- it is possible to scientifically classify management work,
- it makes the development of technical work logical and simple,
- it facilitated the development of a logical integrated management planning process,
- a practical planning structure for the South African mining industry followed logically from it (refer figure 5.17),
- the planning process was applicable to each plan whether small or large or long or short term,
- it could be applied on all the levels of the organisation, and
- it recognised the reality of and the need for every employee to plan for the results required from him.

The systematic and logical development of the theory:

- facilitated the classification of management work,
- facilitated the development of a logical planning process,
- facilitated the logical development of a planning structure,
- established the logical application of management principles, and
- ensured efficient delegation.

### **7.2.3.2 The comprehensive management classification**

The classification followed logically from the development of the comprehensive management logic work. The work flow of management work was proposed as a general approach to develop and analyse management work (refer figure 5.15 to 5.15 (c) and table 5.2). It could vary with the:

- strategy of the organisation,
- type of business,
- specific discipline, and
- reasoning capabilities of personnel.

### **7.2.3.3 The planning process**

The proposed planning process was developed from the classification of the comprehensive management work (refer section 5.5.4, figure 5.15 to 5.15 (c) and table 5.2). The process closely followed the sequence of the development of the supporting and controlling tasks of the management main tasks to plan, to implement and to control the plan. From figure 5.17 it was clear that the development of each alternative, as indicated in red in the block, must be repeated in detail so that a more reasoned choice could be made as to which alternative method would be the best (refer section section 5.6.2).

The proposed planning process would enable management in the South African mining industry to:

- more accurately determine the required results for each employee,

- develop the objective for each employee, section, department and the company,
- integrate, align, coordinate and optimise objectives per employee, section, department and the organisation as a whole,
- develop the most probable alternative methods optimise the resources and performance,
- select the best method with which to realise these objectives,
- determine the necessary performance standards for each task,
- develop the work flow and task and resources for all work,
- effectively delegate, coordinate and integrate all work,
- establish control and corrective measures,
- timeously identify future risks, threats and opportunities,
- efficiently accommodate any foreseen and unforeseen changes and risks,
- computerise the total management method for each employee, level and the organisation as a whole,

#### **7.2.3.4 The planning structure**

The proposed planning structure was derived from the development of the work to manage (refer section 5.4 and table 5.2). The main advantages of the planning structure, are that it would:

- serve as an accurate core management control system,
- enhance the compilation for all work, employees, section, departments and the organisation as a whole,
- establish effective control for each task, employee, section, department and the organisation as a whole,
- direct the integrated action of all employees,
- enable the organisation to plan efficiently and systematically in order to detect all possible deficiencies, and

According to Daft (1995:511) the core control system consists of:

- all the different plans in the planning structure from the top to the bottom of the organisation, and
- the control systems of the various departments, sections and the organisation as a whole.

This planning structure would be easy to implement by every employee on every level of the organisation. Any required change in any of the results could easily be detected and accommodated throughout the entire organisation.

#### **7.2.3.5 Development of alternative methods**

As mentioned in this thesis there would normally be more than one method with which to achieve the specific desired results. It would be the duty of each employee to always develop possible alternatives, select the one best alternative from these and then develop it further. The alternative to

manage selected in chapter 5 was broken up into the main tasks to plan, to implement and to control the plan. It could also have been broken up into the main tasks to plan and to commission the plan (refer section 5.5.1). The main task to commission the plan could further be developed in the supporting tasks to implement the plan, to operate the plan and to control the plan. The complete development of both alternatives should eventually result in the same results. This reasoning demonstrates that there could be more than one method to achieve the required results. The employee should always develop alternative methods for each set of results required all the way down to the last set of results required. When developing the work flows each employee should keep this important requirement in mind. It would result in a lot of work but it would facilitate and enhance the development and optimising of the company's results

### 7.3 COMPARISON OF THE COMPREHENSIVE, PRACTICAL AND INTEGRATED MANAGEMENT METHOD WITH THE ADMINISTRATIVE MANAGEMENT APPROACH

Administrative management approach	Comprehensive, practical and integrated management method
1. See management as a process consisting of the four functions of planning, organising, leading and controlling (refer section 2.5.1.1 (d))	See management as a process consisting of the three main tasks to plan, implement and control
2. Not based on a specific logic (refer section 2.5.1.1 (d))	Is based on a specific logic (refer section 5.4.2)
3. No procedure to implement (refer section 2.5.1.1 (d))	Has a specific detailed procedure to implement (refer chapter 6)
4. Is not a comprehensive management method	Is a totally comprehensive management method
5. Has no logical management classification	Has a logical management classification
6. Has no specific logical planning process	Has a specific logical planning process
7. Is not possible to properly integrate and coordinate	Can be totally integrated and coordinated
8. Can not logically be developed down to the last level	Can be logically developed down to the last level
9. Is time consuming and not possible to adjust for the total organisation on all the levels and perform what-if scenarios	Is quick to adjust for the total organisation and to perform what-if scenarios
10 Not practically suitable for total computerisation	Is ideally suited for total computerisation
11. Impossible to efficiently implement and apply for the the total organisation	Easy to implement and apply for the total organisation
12. Provides little directives as to where and when to apply management skills such as communication, motivation, decisionmaking, etc	Clearly states that the method requires that these skills being applied where and when necessary

**Table 7.2: Evaluation of existing management practices and the comprehensive, practical and integrated management method**

From the comparison below it would appear that much of the administrative management approach forms part of the comprehensive management logic. It is also clear that the administrative management approach is not a comprehensive management approach in the aspects outlined above. It can not entirely support a comprehensive management method.

## **7.4 RECOMMENDATIONS**

### **7.4.1 Recommendations with specific reference to the South African mining industry**

The average overall managerial knowledge and competency gap of 55.94 per cent of management in the mining industry in general was unacceptably high (refer section 4.3.10 3, 4.4.14, 4.4.17, figure 4.17 and table 4.15). It is logical that the reduction of this gap would tremendously improve the performance of the industry. Existing available management practices proved to be inadequate to enable the industry to manage in a comprehensive, practical and integrated manner (refer section 2.8 and 4.4.3). This deficiency is considered to be the main reason for the industry's unacceptable production and, safety performance and deteriorating global competitiveness.

The management component of the Mine Manager's Certificate of Competency syllabus is proved to be totally inadequate to enable mine managers to manage comprehensively (refer section 4.4.15). Serious management deficiencies with respect to the planning and organising functions of management were identified mainly because the existing management theories do not provide the necessary theoretical bases for the efficient execution of these functions. The existing planning processes, proposed by the various authors on management principles and supported and being utilised by the majority of management practitioners in the mining industry, proved to be inadequate to comply with the requirements of a comprehensive, practical and integrated management method (refer section 2.2.1, 4.4.3, figure 5.17 and table 2.4).

It is recommended that the industry thoroughly study the conclusions and recommendations proposed in this thesis with a view to:

- 7.4.1.1 evaluate the proposed theory and procedure,
- 7.4.1.2 consider an industry representative competency survey in order to determine the state of the management competencies on all the levels in the industry,
- 7.4.1.3 consider a comprehensive global industry-wide survey with respect to the existing management practices presently being utilised in the global mining industry,
- 7.4.1.4 evaluate the potential contribution of these practices to the realisation of the stated desire of the South African mining industry to once again become the leader in the world mining arena,
- 7.4.1.5 implement the comprehensive, practical and integrated management method in the industry, and
- 7.4.1.6 in the process of implementing the method do it on a planned and controlled basis, involving all the stakeholders in the industry (refer section 6.4).

## **7.4 2 Recommendations for further research**

Although the comprehensive, practical and integrated management method was proposed as the one best management method constraints such as volume and time limited the detailed development of all the relevant management aspects in this thesis. The topic of this thesis was to develop a comprehensive management method that would solve all the identified deficiencies of existing management practices utilised in the South African mining industry. The author concentrated on the development of this management method.

The following management work within the proposed theory and procedure should, for the sake of completeness be researched in more detail:

7.4.1 Planning on a comprehensive, practical and integrated basis.

7.4.2 Development of organisational structures.

7.4.3 The place and utilisation of people aspects such as:

7.4.3.1 decisionmaking,

7.4.3.2 communication,

7.4.3.3 motivation,

7.4.3.4 coordination,

7.4.3.5 integration, and

7.4.3.6 delegation.

7.4.4 Controlling on a comprehensive and integrated basis, and

7.4.5 Development of an intrinsic coding system for the implementation and management of the comprehensive, practical and integrated management method.

## **7.5. CONCLUSION**

It was proved in this thesis that existing management practices are inadequate. As a result the South African mining industry can not optimise the available scarce resources at its disposal in order to realise its objectives. The comprehensive, practical and integrated management method was developed and proposed in this thesis as the solution to the industry's managerial problems. This management method would be relative easy to comprehend and implement on all the levels of the South African mining industry.

It is proposed that the leaders in the South African mining industry seriously consider the recommendations proposed in section 7.4 of this chapter. The conscientious application of this management method would enable the industry to regain its former leading position in the global mining arena and to stay in that position. Its ability to increase production, safety and cost performance would increase and more job opportunities would be created with the added advantage to the communities and the country as a whole.

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CHIEF EXECUTIVE OFFICER QUESTIONNAIRE: MINE GROUP

**RESEARCH INFORMATION FOR PhD. DEGREE: COVER LETTER**

**Dear sir/madam**

I am currently conducting research into “**The Development Of a Comprehensive, Practical And Integrated Management Method With Specific Reference To The South African Mining Industry,**” as part of my PhD. studies at the University of Pretoria. To this end I kindly request that you complete the following questionnaire.

The completion of this questionnaire should not take more than 30 minutes of your time. Your response will be of the utmost importance to the Mining Industry and to this study. Personally, I have been in a managerial position in the Mining Industry for more than 30 years. My experience, until retirement, was that the available and legally required management approaches were inadequate to enable management to manage on a realistic, comprehensive and practical basis. Therefore, management utilised and is still using expensive short-term management development programmes and interventions on a regular basis sometimes with limited and questionable results. I have researched for many years into the practicality of existing management approaches and concluded that there exists no single approach that will fulfil in management’s needs on a long-term comprehensive basis. I am convinced that I have eventually developed a management approach that will fulfil completely in management’s legitimate needs.

As I may need to clarify some of your answers to the questions, I will appreciate it if you will be so kind as to enter your name and contact details in the spaces provided. Your cooperation in this regard is, however, voluntary. All information and personal detail will be treated most confidentially at all times. Kindly e-mail your completed questionnaire directly to me to the address below as soon as possible but not later than 7 November 2004.

Should you have any queries or comments regarding this questionnaire, you are welcome to contact me personally at 072 282 5465. Alternatively, you can e-mail me at [jdspims@mweb.co.za](mailto:jdspims@mweb.co.za) or mail a hard copy of the completed questionnaire to P O Box 3703, Witbank, 1035.

Yours sincerely

J D Stone.  
Prof N van der Merwe,  
Supervisor, UP.

**Section A: Background Information**

**Research: A Practical Integrated Management Approach**

When completing this section please print, if not e-mailing.

Date: 2004: ..... Name: .....

Company: .....

Tel/Fax: ..... e-mail: .....

Vision of company: .....

.....

.....

Mission of company: .....

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**Section B: Management Work**

Please answer the following questions by making a cross (x) in the relevant blocks provided.

Please note that in this research, the following definitions would apply:

A management approach is a general overall method/style of management, which encompasses all of the functions of management work.

A management programme is a programme, which is directed at the introduction or improvement of a specific management function or skill such as communication skills, negotiation skills, motivation skills etc.

A management intervention is a deliberate effort/input of relative short duration, introduced with the aim to introduce, update or improve specific management performances and techniques such as safety, cost, production, improved human relations, and zero based budgeting, activity based costing, linear programming etc.

Please use the following scale for assessment:

There are 5 columns indicating the following

Column 0 = No/Not/Never.

Column 1 = Seldom.

Column 2 = Sometimes.

Column 3 = Most of the time.

Column 4 = Yes/Always.

Example:

I give the correct instructions.

(You are then saying:” I sometimes give the correct instructions.”)

0	1	2	3	4
---	---	---	---	---

1. Please, indicate to what extent you make or made use of the following management approaches/programmes/interventions in your management:

i) Build specific procedures and processes into operations.

0	1	2	3	4
---	---	---	---	---

ii) Use time and method studies in setting detailed procedures.

0	1	2	3	4
---	---	---	---	---

iii) Relies on rules, a set hierarchy, a clear division of labour and detailed procedures.

0	1	2	3	4
---	---	---	---	---

iv) Use the functions of planning, organising, leading and controlling (POLC).

0	1	2	3	4
---	---	---	---	---

v) Focus on the importance of relationships among people and productivity.

0	1	2	3	4
---	---	---	---	---

vi) Apply quantitative analysis to management decisions and problems.

0	1	2	3	4
---	---	---	---	---

vii) Study and identify management activities that promote employee effectiveness.

0	1	2	3	4
---	---	---	---	---

viii) View the organisation or any part of it as a system or systems that make up the whole.

0	1	2	3	4
---	---	---	---	---

iv) Identifies key variables in each situation at hand.

0	1	2	3	4
---	---	---	---	---

x) The management theory of the Mine Managers, Certificate of Competency is adequate for the efficient performance of my management work.

0	1	2	3	4
---	---	---	---	---

2. List the most important approaches/programmes or interventions that you are using/used or were exposed to:

2.1. Management approaches:

i).....

ii).....

iii).....

2.2. Management programmes:

i).....

ii).....

iii).....

2.3. Management interventions:

i).....

ii).....

iii).....

3. In a few sentences can you please describe each of these approaches/programmes/ interventions:

3.1. Management approaches

.....  
.....  
.....

3.2. Management programmes

.....



.....  
3.3. Management interventions

.....  
.....  
.....

4. Please state the source(s) from which each approach/programme/intervention originated, e.g. abroad (USA), South Africa or in-house.

4.1. Management approaches:

.....  
.....

4.2. Management programmes:

.....  
.....

4.3 Management interventions:

.....

5. Can you please state, where available, the:

5.1. Management approaches

i) acquisition cost of each.....

ii) implementation cost of each .....

iii) maintenance cost of each.....

iv) contribution (R pay-off or other value) of each .....

v) duration or period of application.....



vi) management level at which utilised .....

5.2. Management programmes:

i) acquisition cost of each.....

ii) implementation cost of each .....

iii) maintenance cost of each.....

iv) contribution (R pay-off or other value) of each .....

v) duration or period of application.....

vi) management level at which utilised.....

5.3 Management interventions

i) acquisition cost of each.....

ii) implementation cost of each .....

iii) maintenance cost of each.....

iv) contribution (R pay-off or other value) of each .....

v) duration or period of application.....

vi) management level at which utilised.....

6. Which of these approaches/programmes/interventions are you still using in the group, for what reason(s), period, why and at which management level(s)?

.....  
.....  
.....

7. List the main shortcomings/limitations (if any) that you have/had with past/existing approaches/programmes/interventions:

.....

.....

.....

8. Please, specify your criteria/requirements for the ideal management approach.?

.....

.....

.....

9. Please indicate whether you do and at what intervals, compile a:

9.1. strategic plan .....

9.2. long-term plan (>5 yrs).....

9.3. medium-term plan (3-5 yrs).....

9.4. short-term plan (1-3 yrs).....

9.5. operational plan ( 1 yr).....

9.6. List the steps in your planning process .....

.....

.....

.....

.....

.....



10. Please, indicate how and where the following steps are performed:

10.1. determination of the best achievable results.....

.....

10.2. formulation of objectives .....

.....

10.3. development of alternatives.....

.....

10.4. selection of the best alternative.....

.....

10.5. task and resources analysis.....

.....

10.6. performance standards.....

.....

10.7. cost determination.....

.....

10.8. determination of resources .....

.....

10.9. assessments of risks.....

.....

10.10. determination of posts.....

.....





10.11. delegation of accountability.....

.....

10.12. determination of the organisation structure.....

.....

..

10.13. determination of lines of authority.....

.....

10.14. determination of communication .....

.....

10.15. determination of job specifications.....

.....

10.16. determination of supervision schedules.....

.....

10.17. determination of supervision accountability.....

.....

10.18. computerisation of planning.....

.....

11. Please, list the factors that affect the company:

11.1. environmental.....

.....

11.2. economical.....

.....



11.3. governmental .....  
.....  
.....

12. List the most important threats to your company.  
.....  
.....

13. In the company:  
13.1. how are managerial skills developed? .....  
.....  
.....

13.2. list the approaches/programmes/which/interventions and relevant level.  
.....  
.....

13.3. list the main institutions utilised.....  
.....  
.....

14. List the different mines in your organisation  
Mine.....  
Mineral.....  
Annual production (ROM tons).....  
.....



15. Do all the mines utilise the same i.e. the group management approach?

.....

Please list any additional information you deem relevant where applicable:

.....

Thank you for your co-operation in completing this questionnaire. Kindly return it as specified in the cover letter.

EXECUTIVE LEVEL HOD HEAD OFFICE

**RESEARCH INFORMATION FOR PhD. DEGREE: COVER LETTER**

**Dear sir/madam**

I am currently conducting research into “**The Development Of a Comprehensive, Practical And Integrated Management Method With Specific Reference To The South African Mining Industry,**” as part of my PhD. studies at the University of Pretoria. To this end I kindly request that you complete the following questionnaire.

The completion of this questionnaire should not take more than 30 minutes of your time. Your response will be of the utmost importance to the Mining Industry and to this study.

As I may need to clarify some of your answers to the questions, I will appreciate it if you will be so kind as to enter your name and contact details in the spaces provided. Your cooperation in this regard is, however, voluntary.

All information and personal detail will be treated most confidentially at all times.

Kindly e-mail your completed questionnaire directly to me to the address below as soon as possible but not later than .....

Should you have any queries or comments regarding this questionnaire, you are welcome to contact me personally at 072 282 5465. Alternatively, you can e-mail me at [jdspims@mweb.co.za](mailto:jdspims@mweb.co.za)

Yours sincerely

J D Stone.

Prof N van der Merwe,  
Supervisor, UP.



**Section A: Background Information**

**Research: A Practical Integrated Management Approach**

When completing this section please print, if not e-mailing.

Date: 2004. ....Company: .....

Name: .....Tel/Fax.....e-mail.....

Position: ..... Department: .....

Educational qualifications: (Highest qualification achieved at)

School: .....

College: .....

Technicon: .....

University: .....

Other: .....

Give a brief description of your training in the following areas:

Practical training: .....

.....

Technical training: .....

.....

Management training .....

.....

Vision of department: .....

.....

Mission of department: .....

.....

.....

**Section B: Management Work**

Please answer the following questions by making a cross (x) in the relevant blocks provided.

Please note that in this research, the following definitions would apply:

A management approach is a general overall method/style of management, which encompasses all of the functions of management work.

A management programme is a programme, which is directed at the introduction or improvement of a specific management function or skill such as communication skills, negotiation skills, motivation skills etc.

A management intervention is a deliberate effort/input of relative short duration, introduced with the aim to either introduce, update or improve specific management performances and techniques such as safety, cost, production, improved human relations, zero based budgeting, activity based costing, linear programming etc.

Please use the following scale for assessment: There are 5 columns indicating the following:

Column 0 = No/Not/Never.

Column 1 = Seldom.

Column 2 = Sometimes.

Column 3 = Most of the time

Column 4 = Yes/Always.

Example:

I give the correct instructions.

(You are then saying:” I sometimes give the correct instructions.”)

0	1	<input checked="" type="checkbox"/>	3	4
---	---	-------------------------------------	---	---

1. manage according to a specific management approach.

0	1	2	3	4
---	---	---	---	---

2. This management approach enables me to achieve my results most efficiently.

0	1	2	3	4
---	---	---	---	---



3. In addition to the specific management approach, also, use other approaches/programmes/interventions. 

0	1	2	3	4
---	---	---	---	---
4. The management approach I apply enables me to computerise my management system. 

0	1	2	3	4
---	---	---	---	---
5. The management approach facilitates my planning. 

0	1	2	3	4
---	---	---	---	---
6. I am trained to apply management principles. 

0	1	2	3	4
---	---	---	---	---
7. I understand my objective in the organisation. 

0	1	2	3	4
---	---	---	---	---
8. I know what results are required from me. 

0	1	2	3	4
---	---	---	---	---
9. I know how to achieve the required results. 

0	1	2	3	4
---	---	---	---	---
10. I have the authority to take the necessary decisions. 

0	1	2	3	4
---	---	---	---	---
11. I accept accountability for the planning of the results required from me. 

0	1	2	3	4
---	---	---	---	---
12. I compile a strategic plan 

0	1	2	3	4
---	---	---	---	---
13. I compile a long-term plan. 

0	1	2	3	4
---	---	---	---	---
14. I compile a medium term plan. 

0	1	2	3	4
---	---	---	---	---
15. I compile short-term plans. 

0	1	2	3	4
---	---	---	---	---
- 16 My planning is initiated by my superior's request for the results, he requires from me. 

0	1	2	3	4
---	---	---	---	---
17. My planning is also initiated by new business challenges. 

0	1	2	3	4
---	---	---	---	---
18. My planning is also initiated by my own initiatives. 

0	1	2	3	4
---	---	---	---	---
19. I forecast the most probable conditions that can affect the achievement of the required results. 

0	1	2	3	4
---	---	---	---	---
20. I list the most achievable results. 

0	1	2	3	4
---	---	---	---	---



21. I reach consensus with all stakeholders before taking a decision on the results to plan for. 

0	1	2	3	4
---	---	---	---	---
22. I formulate the objective for the required results. 

0	1	2	3	4
---	---	---	---	---
23. I develop alternative methods to achieve the results required. 

0	1	2	3	4
---	---	---	---	---
24. I develop each alternative into logical sequences of tasks. 

0	1	2	3	4
---	---	---	---	---
25. I determine the required resources for each alternative. 

0	1	2	3	4
---	---	---	---	---
26. I schedule the period for each alternative. 

0	1	2	3	4
---	---	---	---	---
27. I compile the budget for each alternative. 

0	1	2	3	4
---	---	---	---	---
28. I select the best alternative. 

0	1	2	3	4
---	---	---	---	---
29. I plan for the selected alternative. 

0	1	2	3	4
---	---	---	---	---
30. I computerise the final plan. 

0	1	2	3	4
---	---	---	---	---
31. I control the execution of the plan. 

0	1	2	3	4
---	---	---	---	---
32. I group tasks into posts. 

0	1	2	3	4
---	---	---	---	---
33. I delegate posts with authority to sub-ordinates. 

0	1	2	3	4
---	---	---	---	---
34. I develop my own organizational structure. 

0	1	2	3	4
---	---	---	---	---
35. I take sound decisions. 

0	1	2	3	4
---	---	---	---	---
36. There is an open channel of communication between my supervisor and me. 

0	1	2	3	4
---	---	---	---	---
37. There is an open channel of communication between my subordinates and me. 

0	1	2	3	4
---	---	---	---	---
38. My subordinates are trained to communicate with all relevant people. 

0	1	2	3	4
---	---	---	---	---
39. I motivate my subordinates. 

0	1	2	3	4
---	---	---	---	---





40. My supervisor motivates me. 

0	1	2	3	4
---	---	---	---	---
41. I select the people that work for me. 

0	1	2	3	4
---	---	---	---	---
42. I accept accountability for the training of my subordinates. 

0	1	2	3	4
---	---	---	---	---
43. I exercise fair discipline. 

0	1	2	3	4
---	---	---	---	---
44. I develop performance standards. 

0	1	2	3	4
---	---	---	---	---
45. I measure and evaluate performance regularly. 

0	1	2	3	4
---	---	---	---	---
46. I identify unacceptable deviations from standards. 

0	1	2	3	4
---	---	---	---	---
47. I correct deviations from the standards. 

0	1	2	3	4
---	---	---	---	---
48. I set tolerances to facilitate control. 

0	1	2	3	4
---	---	---	---	---
49. I control the utilisation of company assets. 

0	1	2	3	4
---	---	---	---	---
50. I control for the adherence to planned standards 

0	1	2	3	4
---	---	---	---	---

**Section C: General**

Please print, if not e-mailing this section.

1. Please, indicate to what extent you make use of the following management approaches/programmes/interventions in your management:

- i) Build specific procedures and processes into operations. 

0	1	2	3	4
---	---	---	---	---
- ii) Use time and method studies in setting detailed procedures. 

0	1	2	3	4
---	---	---	---	---
- iii) Relies on rules, a set hierarchy, a clear division of labour and detailed procedures. 

0	1	2	3	4
---	---	---	---	---
- iv) Use the functions of planning, organising, leading and controlling. 

0	1	2	3	4
---	---	---	---	---
- v) Focus on the importance of relationships among people and productivity. 

0	1	2	3	4
---	---	---	---	---



vi) Apply quantitative analysis to management decisions and problems. 

0	1	2	3	4
---	---	---	---	---

vii) Study and identify management activities that promote employee effectiveness. 

0	1	2	3	4
---	---	---	---	---

viii) View the organisation or any part of it as a system or systems that make up the whole. 

0	1	2	3	4
---	---	---	---	---

iv) Identifies key variables in each situation at hand. 

0	1	2	3	4
---	---	---	---	---

x) Assessment of the Mine Managers Certificate of Competency for its adequacy for management on a mine. 

0	1	2	3	4
---	---	---	---	---

2. List the most important approaches/programmes or interventions that you are using/used or were exposed to:

2.1. Management approaches:

i).....

ii).....

iii).....

2.2. Management programmes:

i).....

ii).....

iii).....

2.3. Management interventions:

i).....

ii).....

iii).....

3. In a few sentences can you please describe each of these approaches/programmes/  
interventions:

3.1. Management approaches

.....  
.....

3.2. Management programmes

.....  
.....

3.3. Management interventions

.....  
.....

4. Please state the source(s), from which each approach/programme/intervention  
originated, e.g. abroad (USA), South Africa or in-house.

4.1. Management approaches: .....

.....  
.....

4.2. Management programmes: .....

.....  
.....

4.3. Management interventions: .....

.....  
.....

5. Can you please state, where available, the:

5.1. Management approaches

- i) acquisition cost of each.....
- ii) implementation cost of each .....
- iii) maintenance cost of each.....
- iv) contribution (R pay-off or other value) of each .....
- v) duration or period of application.....
- vi) management level at which utilised .....

5.2. Management programmes

- i) acquisition cost of each.....
- ii) implementation cost of each .....
- iii) maintenance cost of each.....
- iv) contribution (R pay-off or other value) of each .....
- v) duration or period of application.....
- vi) management level at which utilised.....

5.3. Management interventions

- i) acquisition cost of each.....
- ii) implementation cost of each .....
- iii) maintenance cost of each.....
- iv) contribution (R pay-off or other value) of each .....
- v) duration or period of application .....

vi) management level at which utilised.....

6. Which of these approaches/programmes/interventions are you still using in the group, for what reason(s), period, why and at which management level?

.....  
.....

7. List the main shortcomings/limitations (if any) that you have/had with past/existing approaches/programmes/interventions:

.....  
.....

8. Please, specify your criteria/requirements for the ideal management approach?

.....  
.....

9. Please, list the steps in your planning process.

9.1. strategic planning.....

.....  
.....

9.2. long-term planning.....

.....  
.....

9.3. medium-term planning.....

.....  
.....



9.4. operational planning.....  
.....  
.....

10. What are the most important challenges/opportunities facing your department?  
.....  
.....

11. List the most important threats to your department.  
.....  
.....

12. In your department,  
  
i) how do you develop managerial skills? .....  
.....  
.....

ii) list the approaches/programmes/which/interventions and relevant level.  
.....  
.....

13. With regard to your personal management development, please list the most important programmes you have attended and completed successfully:  
  
i) internally .....  
.....

ii) externally.....  
.....

14. Do you, in your department, implement the policies set by the chief executive officer?

.....

.....

15. Please, indicate the percentage of time that you spend, on average over the long-term, on a scale of 0% to 100%, on your work as Head of your Department:

For the purpose of completing this section the following definitions will apply:

Human work consists of management and technical work.

Management work refers to the execution of the management functions (planning, organising, leading and controlling and their respective activities.

Technical work refers to any other work that the manager performs in carrying out his duties.

Work	Percentage (%)											
	0	10	20	30	40	50	60	70	80	90	100	
Planning												
- Strategic planning												
- Long-term planning												
- Medium-term planning												
- Operational planning												
- Budgeting												
Organising												
Leading												
Controlling												
Management work												
Technical work												
Total human work												

Thank you for your co-operation in completing this questionnaire. Kindly return it as specified in the cover letter.

GENERAL/MINE MANAGER

**RESEARCH INFORMATION FOR PhD. DEGREE:COVER LETTER**

**Dear sir/madam**

I am currently conducting research into “**The Development Of a Comprehensive, Practical And Integrated Management Method With Specific Reference To The South African Mining Industry,**” as part of my PhD. studies at the University of Pretoria. To this end I kindly request that you complete the following questionnaire. The completion of this questionnaire should not take more than 30 minutes of your time. Your response will be of the utmost importance to the Mining Industry and to this study.

Personally, I have been in a managerial position in the Mining Industry for more than 30 years. My experience, until retirement, was that the available and legally required management approaches were inadequate to enable management to manage on a comprehensive, realistic and practical basis. Therefore, management utilised and is still using expensive short-term management development programmes and interventions on a regular basis sometimes with limited and questionable results. I have researched for many years into the practicality of existing management approaches and concluded that there exists no single approach that will fulfil in management’s needs on a long-term comprehensive basis. I am convinced that I have eventually developed a management approach that will fulfil completely in management’s legitimate needs.

As I may need to clarify some of your answers to the questions, I will appreciate it if you will be so kind as to enter your name and contact details in the spaces provided. Your cooperation in this regard is, however, voluntary. All information and personal detail will be treated most confidentially at all times.

Kindly e-mail your completed questionnaire directly to me to the address below as soon as possible but not later than 7 November 2004.

Should you have any queries or comments regarding this questionnaire, you are welcome to contact me personally at 072 282 5465. Alternatively, you can e-mail me at [jdspims@mweb.co.za](mailto:jdspims@mweb.co.za). or mail a hard copy of the completed questionnaire to P O Box 3703, Witbank, 1035.

Yours sincerely

J D Stone.

Prof N van der Merwe,

Supervisor, UP.



**Section A: Background Information**

**Research: Practical Integrated Management Approach.**

When completing this section please print.

Date:2004:.....Mine.....Position.....

Name: .....Tel/Fax.....e-mail.....

Educational qualifications: (Highest qualifications achieved at)

College: .....

Technicon: .....

University: .....

Other: .....

Give a brief description of your training in the following areas:

Practical: .....

.....

Technical: .....

.....

Management: .....

.....

Vision of mine: .....

.....

Mission of mine.....

.....

**Section B: Management Work**

Please answer the following questions by making a cross (x) in the relevant blocks provided.

Please note that in this research, the following definitions will apply:

A management approach is a general overall method/style of management, which encompasses all of the functions of management work.

A management programme is a programme, which is directed at the introduction or improvement of a specific management function or skill such as communication skills, negotiation skills, motivation skills etc.

A management intervention is a deliberate effort/input of relative short duration, introduced with the aim to introduce, update or improve specific management performances and techniques such as safety, cost, human relations, zero based budgeting, activity based costing, linear programming etc.

Please use the following scale for assessment:

There are 5 columns indicating the following

Column 0 = No/Not/Never.

Column 1 = Seldom.

Column 2 = Sometimes.

Column 3 = Most of the time.

Column 4 = Yes/Always.

Example:

I give the correct instructions.

You are then saying:” I sometimes give the correct instructions”.

0	1	<input checked="" type="checkbox"/>	3	4
---	---	-------------------------------------	---	---

Please complete the following:

1. I manage according to a specific management approach.

0	1	2	3	4
---	---	---	---	---

2. I am trained to apply this management approach.

0	1	2	3	4
---	---	---	---	---

3. The management approach I apply is based on management principles.

0	1	2	3	4
---	---	---	---	---



4. This management approach enables me to manage my results efficiently. 

0	1	2	3	4
---	---	---	---	---
5. This management approach enables me to computerise my total planning 

0	1	2	3	4
---	---	---	---	---
6. I am trained to apply management principles. 

0	1	2	3	4
---	---	---	---	---
7. I understand my objective in the organisation. 

0	1	2	3	4
---	---	---	---	---
8. I know what results are required from me. 

0	1	2	3	4
---	---	---	---	---
9. I know how to achieve the required results. 

0	1	2	3	4
---	---	---	---	---
10. I have the authority to take the necessary decisions. 

0	1	2	3	4
---	---	---	---	---
11. I accept accountability for the planning of my results. 

0	1	2	3	4
---	---	---	---	---
12. I compile a strategic plan. 

0	1	2	3	4
---	---	---	---	---
13. I compile a long-term plan. 

0	1	2	3	4
---	---	---	---	---
14. I compile a medium term plan. 

0	1	2	3	4
---	---	---	---	---
15. I compile short term plans. 

0	1	2	3	4
---	---	---	---	---
16. I compile project plans. 

0	1	2	3	4
---	---	---	---	---
17. I compile contingency plans. 

0	1	2	3	4
---	---	---	---	---
18. I identify procedures during planning. 

0	1	2	3	4
---	---	---	---	---
19. I compile emergency plans. 

0	1	2	3	4
---	---	---	---	---
20. My planning is initiated by the company's performance requirements. 

0	1	2	3	4
---	---	---	---	---
21. I forecast the most probable conditions that can affect the achievement of the required results. 

0	1	2	3	4
---	---	---	---	---
22. I list the most probable achievable results 

0	1	2	3	4
---	---	---	---	---



23. I reach agreement with stakeholders on what results to plan for. 

0	1	2	3	4
---	---	---	---	---
24. I formulate the objective for the required results. 

0	1	2	3	4
---	---	---	---	---
25. I develop alternative methods to achieve the required results. 

0	1	2	3	4
---	---	---	---	---
26. I develop each alternative into a logical sequence of tasks. 

0	1	2	3	4
---	---	---	---	---
27. I determine for each alternative the required resources. 

0	1	2	3	4
---	---	---	---	---
28. I schedule the time frame for each alternative. 

0	1	2	3	4
---	---	---	---	---
29. I compile the budget for each alternative. 

0	1	2	3	4
---	---	---	---	---
30. I select the best alternative. 

0	1	2	3	4
---	---	---	---	---
31. I plan for the selected alternative. 

0	1	2	3	4
---	---	---	---	---
32. I group the tasks into posts. 

0	1	2	3	4
---	---	---	---	---
33. I delegate posts to sub-ordinates. 

0	1	2	3	4
---	---	---	---	---
34. My superior delegates to me. 

0	1	2	3	4
---	---	---	---	---
35. I take sound decisions. 

0	1	2	3	4
---	---	---	---	---
36. There is an open channel of communication between me and my supervisor. 

0	1	2	3	4
---	---	---	---	---
37. There is an open channel of communication between me and my subordinates. 

0	1	2	3	4
---	---	---	---	---
38. My subordinates are trained to communicate with all stakeholders. 

0	1	2	3	4
---	---	---	---	---
39. I motivate my subordinates. 

0	1	2	3	4
---	---	---	---	---
40. My supervisor motivates me. 

0	1	2	3	4
---	---	---	---	---



41. I select the people to work for me. 

0	1	2	3	4
---	---	---	---	---
42. I accept full accountability for the training of my subordinates. 

0	1	2	3	4
---	---	---	---	---
43. I exercise fair discipline. 

0	1	2	3	4
---	---	---	---	---
44. I develop performance standards. 

0	1	2	3	4
---	---	---	---	---
45. I receive regular performance reports. 

0	1	2	3	4
---	---	---	---	---
46. I measure and evaluate performance against the set standards. 

0	1	2	3	4
---	---	---	---	---
47. I correct deviations from the standard. 

0	1	2	3	4
---	---	---	---	---
48. I set tolerances to facilitate control. 

0	1	2	3	4
---	---	---	---	---
49. I control the utilisation of company assets. 

0	1	2	3	4
---	---	---	---	---
50. I control for the adherence to planned standards. 

0	1	2	3	4
---	---	---	---	---

**Section C: General**

Please print, if not e-mailing. Use the previous scale for assessing.

1. Please, indicate to what extend you make use of the following management practices in your management: 

0	1	2	3	4
---	---	---	---	---
- i) Build specific procedures and processes into operations. 

0	1	2	3	4
---	---	---	---	---
- ii) Use time and method studies in setting detailed procedures. 

0	1	2	3	4
---	---	---	---	---
- iii) Relies on rules, a set hierarchy, a clear division of labour and detailed procedures. 

0	1	2	3	4
---	---	---	---	---
- iv) Use the functions of planning, organising leading and controlling. 

0	1	2	3	4
---	---	---	---	---
- v) Focus on the importance of relationships among people and productivity. 

0	1	2	3	4
---	---	---	---	---



vi) Apply quantitative analysis to management decisions and problems.

0	1	2	3	4
---	---	---	---	---

vii) Study and identify management activities that promotes employee effectiveness.

0	1	2	3	4
---	---	---	---	---

viii) View the organisation or any part of it as a system or systems that make up the whole.

0	1	2	3	4
---	---	---	---	---

xi) Identifies key variables in each situation at hand.

0	1	2	3	4
---	---	---	---	---

x) How do you assess the management theory of the Mine Managers' Certificate of Competency's adequacy for the efficient performance of your management work?

0	1	2	3	4
---	---	---	---	---

2. List the most important management practices that you are using/used or were exposed to:

2.1 Management approaches:

i).....

ii).....

iii).....

2.2 Management programmes:

i).....

ii).....

iii).....

2.3 Management interventions:

i).....

ii).....

iii).....

3. In a few sentences can you please describe each of these approaches/programmes/  
interventions:

3.1 Management approaches

.....  
.....

3.2 Management programmes

.....  
.....

3.3 Management interventions

.....  
.....  
.....

4. Please state the source(s), from which each approach/programme/intervention  
originated, e.g. abroad (USA), South Africa, within the company or in-house.

4.1 Management approaches .....

.....  
.....

4.2 Management programmes .....

.....  
.....



4.3 Management interventions.....  
.....  
.....

5. Can you please state, where available, the:

5.1 Management approaches

- i) acquisition cost of each.....
- ii) implementation cost of each .....
- iii) maintenance cost of each.....
- iv) contribution (R pay-off or other value) of each .....
- v) duration or period of application .....
- vi) organisation level at which utilised .....

5.2 Management programmes

- i) acquisition cost of each.....
- ii) implementation cost of each .....
- iii) maintenance cost of each.....
- iv) contribution (R pay-off or other value) of each .....
- v) duration or period of application.....
- vi) organisation level at which utilised.....

5.3 Management interventions

- i) acquisition cost of each.....
- ii) implementation cost of each .....



- iii) maintenance cost of each.....
- iv) contribution (R pay-of or other value) of each .....
- v) duration or period of application.....
- vi) organisation level at which utilised.....

6. Which of these approaches/programmes/interventions are you still using in the group, for what reason(s), period, why and at which management level?

.....

7. List the main shortcomings/limitations (if any) that you have/had with past/existing approaches/programmes/interventions:

.....

8. Please specify your criteria/requirements for the ideal management approach

.....

9. Please indicate whether you do and at what intervals, compile a:

9.1 strategic plan.....

9.2 long-term plan (>5 yrs).....

9.3 medium-term plan (3-5 yrs).....

9.4 short-term plan (1-3 yrs).....

9.5 operational plan (yr).....

9.6 List the steps in your planning process .....

.....

.....

.....



.....

.....

.....

.....

.....

.....

10. Please indicate how and where the following steps are performed:

10.1 determination of the best achievable results.....

.....

10.2 formulation of objectives.....

.....

10.3 development of alternatives.....

.....

10.4 selection of the best alternative.....

.....

10.5 task and resources analysis.....

.....

10.6 performance standards.....

.....

10.7 cost determination.....

.....



- 10.8 determination of resources.....  
.....
- 10.9 assessments of risks.....  
.....
- 10.10 determination of posts.....  
.....
- 10.11 delegation of accountability.....  
.....
- 10.12 determination of the organisation structure.....  
.....
- 10.13 determination of lines of authority.....  
.....
- 10.14 determination of communication.....  
.....
- 10.15 determination of job specifications.....  
.....
- 10.16 determination of supervision schedules.....  
.....
- 10.17 determination of supervision accountability.....  
.....
- 10.18 computerisation of planning.....

11. List the most important threats and or limitations to your mine.

.....  
.....

12. On your mine,

i) how do you develop managerial skills? .....

.....

ii) list the approaches/programmes/interventions and relevant level(s).

.....

13. With regard to your personal management development, please list the most important programmes you have attended and completed successfully:

i) internally .....

.....

ii) externally.....

.....

14. Do you, on your mine, implement the policies set by your superior?

.....

15. Please, indicate the percentage of time that you spend, on average over the long-term, on a scale of 0% to 100%, on your work as General/Mine Manager:

For completing this section the following definitions will apply:

Human work consists of management and technical work.

Management work refers to the execution of the management functions planning, organising, leading and controlling and their respective activities.

Technical work refers to any other work that the manager performs in carrying out his duties.



Work	Percentage (%)										
	0	10	20	30	40	50	60	70	80	90	100
Planning											
- Strategic planning											
- Long-term planning											
- Medium-term planning											
- Operational planning											
- Budgeting											
Organising											
Leading											
Controlling											
Management work											
Technical work											
Total human work											

Thank you for your co-operation in completing this questionnaire. Kindly return it as specified in the cover letter.

MANAGEMENT: HOD LEVEL

**RESEARCH INFORMATION FOR PhD. DEGREE**

**COVER LETTER**

**Dear sir/madam**

I am currently conducting research into “**The Development Of a Comprehensive, Practical And Integrated Management Method With Specific Reference To The South African Mining Industry,**” as part of my PhD. studies at the University of Pretoria.

To this end I kindly request that you complete the following questionnaire. The completion of this questionnaire should not take more than 30 minutes of your time. Your response is of the utmost importance to me.

As I may need to clarify some of your answers to the questions, I will appreciate it if you will be so kind as to enter your name and contact details in the spaces provided. Your cooperation in this regard is, however, voluntary. All information and personal detail will be treated as confidential.

Kindly e-mail the completed questionnaire to the address stated below not later than 7 November 2004.

Should you have any queries or comments regarding this questionnaire, you are welcome to contact me personally at 072 282 5465. Alternatively, you can e-mail me at [jdspims@mweb.co.za](mailto:jdspims@mweb.co.za) or mail a hard copy of the completed questionnaire to P O Box 3703, Witbank, 1035.

Yours sincerely

J D Stone.

Prof. N van der Merwe  
Supervisor, UP.



**Section A: Background Information**

**Research: Practical Integrated Management Approach.**

When completing this section please print if not e-mailing.

Date: 2004. .... Mine.....

Name: .....Tel/Fax.....

Position.....e-mail.....

Educational qualifications: (Highest qualifications achieved at)

School: .....

College: .....

Technicon: .....

University: .....

Other: .....

Give a brief description of your training in the following areas:

Practical: .....

.....

Technical: .....

.....

Management: .....

.....

Vision of department: .....

.....

Mission of department.....  
.....  
.....

**Section B: Management Work**

Please answer the following questions by making a cross (x) in the relevant blocks provided.

Please note that in this research, the following definitions will apply:

A management approach is a general overall method/style of management, which encompasses all of the functions of management work.

A management programme is a programme, which is directed at the introduction or improvement of a specific management function or skill such as communication skills, negotiation skills, motivation skills etc.

A management intervention is a deliberate effort/input of relative short duration, introduced with the aim to either introduce, update or improve specific management performances and techniques such as safety, cost human relations, production, zero based budgeting, activity based costing, linear programming etc.

Please use the following scale for assessment:

Column 0 = No/Not/Never.

Column 1 = Seldom.

Column 2 = Sometimes.

Column 3 = Most of the time.

Column 4 = Yes/Always.

Example:

I give the correct instructions.

0	1	<input checked="" type="checkbox"/>	3	4
---	---	-------------------------------------	---	---

You are then saying:” I sometimes give the correct instructions”.

Please complete the following:

1. I manage according to a specific management approach.

0	1	2	3	4
---	---	---	---	---

2. I am trained to apply this management approach.

0	1	2	3	4
---	---	---	---	---





3. The management approach I apply is based on management principles. 

0	1	2	3	4
---	---	---	---	---
4. This management approach enables me to manage my results efficiently. 

0	1	2	3	4
---	---	---	---	---
5. This management approach enables me to computerize my total planning. 

0	1	2	3	4
---	---	---	---	---
6. I am trained to apply management principles. 

0	1	2	3	4
---	---	---	---	---
7. I understand my objective in the organisation. 

0	1	2	3	4
---	---	---	---	---
8. I know what results are required from me. 

0	1	2	3	4
---	---	---	---	---
9. I know how to achieve the required results. 

0	1	2	3	4
---	---	---	---	---
10. I have the authority to take the necessary decisions. 

0	1	2	3	4
---	---	---	---	---
11. I accept accountability for the planning of my results. 

0	1	2	3	4
---	---	---	---	---
12. I compile a strategic plan. 

0	1	2	3	4
---	---	---	---	---
13. I compile a long-term plan. 

0	1	2	3	4
---	---	---	---	---
14. I compile a medium term plan. 

0	1	2	3	4
---	---	---	---	---
15. I compile short term plans. 

0	1	2	3	4
---	---	---	---	---
16. I compile project plans. 

0	1	2	3	4
---	---	---	---	---
17. I compile contingency plans. 

0	1	2	3	4
---	---	---	---	---
18. I identify procedures during planning. 

0	1	2	3	4
---	---	---	---	---
19. I compile emergency plans. 

0	1	2	3	4
---	---	---	---	---
20. My planning is initiated by the company's performance requirements. 

0	1	2	3	4
---	---	---	---	---
21. I forecast the most probable conditions that can affect the achievement of the required results. 

0	1	2	3	4
---	---	---	---	---



22. I list the most probable achievable results 

0	1	2	3	4
---	---	---	---	---
23. I reach agreement with stakeholders on what results to plan for. 

0	1	2	3	4
---	---	---	---	---
24. I formulate the objective for the required results. 

0	1	2	3	4
---	---	---	---	---
25. I develop alternative methods to achieve the required results. 

0	1	2	3	4
---	---	---	---	---
26. I develop each alternative into a logical sequence of tasks. 

0	1	2	3	4
---	---	---	---	---
27. I determine for each alternative the required resources. 

0	1	2	3	4
---	---	---	---	---
28. I schedule the time frame for each alternative. 

0	1	2	3	4
---	---	---	---	---
29. I compile the budget for each alternative. 

0	1	2	3	4
---	---	---	---	---
30. I select the best alternative. 

0	1	2	3	4
---	---	---	---	---
31. I plan for the selected alternative. 

0	1	2	3	4
---	---	---	---	---
32. I group the tasks into posts. 

0	1	2	3	4
---	---	---	---	---
33. I delegate posts to sub-ordinates. 

0	1	2	3	4
---	---	---	---	---
34. My superior delegates to me. 

0	1	2	3	4
---	---	---	---	---
35. I take sound decisions. 

0	1	2	3	4
---	---	---	---	---
36. There is an open channel of communication between me and my supervisor. 

0	1	2	3	4
---	---	---	---	---
37. There is an open channel of communication between me and my subordinates. 

0	1	2	3	4
---	---	---	---	---
38. My subordinates are trained to communicate with all relevant people. 

0	1	2	3	4
---	---	---	---	---
39. I motivate my subordinates. 

0	1	2	3	4
---	---	---	---	---
40. My supervisor motivates me. 

0	1	2	3	4
---	---	---	---	---



41. I select the people that work for me. 

0	1	2	3	4
---	---	---	---	---
42. I accept full accountability for the training of my subordinates. 

0	1	2	3	4
---	---	---	---	---
43. I exercise fair discipline. 

0	1	2	3	4
---	---	---	---	---
44. I develop performance standards. 

0	1	2	3	4
---	---	---	---	---
45. I receive regular performance reports. 

0	1	2	3	4
---	---	---	---	---
46. I measure and evaluate performance against the set standards. 

0	1	2	3	4
---	---	---	---	---
47. I correct deviations from the standard. 

0	1	2	3	4
---	---	---	---	---
48. I set tolerances to facilitate control. 

0	1	2	3	4
---	---	---	---	---
49. I control the utilisation of company assets. 

0	1	2	3	4
---	---	---	---	---
50. I control for the adherence to planned standards. 

0	1	2	3	4
---	---	---	---	---

**Section C: General**

Please briefly answer the following questions. Please print if not e-mailing.

1. Please indicate to what extent you make use of the following management techniques/methods in your management:

- i) Build specific procedures and processes into operations. 

0	1	2	3	4
---	---	---	---	---
- ii) Use time and method studies in setting detailed procedures. 

0	1	2	3	4
---	---	---	---	---
- iii) Relies on rules, a set hierarchy, a clear division of labour and detailed procedures. 

0	1	2	3	4
---	---	---	---	---
- iv) Use the functions of planning, organising, leading and controlling. 

0	1	2	3	4
---	---	---	---	---
- v) Focus on the importance of relationships among people and productivity. 

0	1	2	3	4
---	---	---	---	---



vi) Apply quantitative analysis to management decisions and problems.

0	1	2	3	4
---	---	---	---	---

vii) Study and identify management activities that promotes employee effectiveness.

0	1	2	3	4
---	---	---	---	---

iii) View the organisation or any part of it as a system or systems that make up the whole.

0	1	2	3	4
---	---	---	---	---

iv) Identifies key variables in each situation at hand.

0	1	2	3	4
---	---	---	---	---

x) How do you assess the management theory of the Mine Managers' Certificate of Competency's adequacy for the efficient performance of your management work?

0	1	2	3	4
---	---	---	---	---

2. List the most important approaches/programmes or interventions that you are using/used or were exposed to:

2.1. Management approaches:

- i).....
- ii).....
- iii).....

2.2. Management programmes:

- i).....
- ii).....
- iii).....

2.3. Management interventions:

- i).....
- ii).....
- iii).....

3. In a few sentences can you please describe each of these approaches/programmes/  
interventions:

3.1. Management approaches

.....  
.....

3.2. Management programmes

.....  
.....

3.3. Management interventions

.....  
.....

4. Please state the source(s), from which each approach/programme/intervention  
originated, e.g. abroad (USA), South Africa, group, on mine or interdepartmental.

4.1. Management approaches

.....  
.....

4.2. Management programmes

.....  
.....

4.3. Management interventions

.....  
.....

5. Can you please state, where available, the:

5.1. Management approaches

- i) acquisition cost of each.....
- ii) implementation cost of each .....
- iii) maintenance cost of each.....
- iv) contribution (R pay-off or other value) of each .....
- v) duration or period of application.....
- vi) organisation level at which utilised .....

5.2. Management programmes

- i) acquisition cost of each.....
- ii) implementation cost of each .....
- iii) maintenance cost of each.....
- iv) contribution (R pay-off or other value) of each .....
- v) duration or period of application.....
- vi) organisation level at which utilised.....

5.3. Management interventions

- i) acquisition cost of each.....
- ii) implementation cost of each .....
- iii) maintenance cost of each.....
- iv) contribution (R pay-off or other value) of each.....
- v) duration or period of application.....
- vi) organisation level at which utilised.....

6. Which of these approaches/programmes/interventions are you still using in your department, for what reason(s), period, why and at which management level?

.....  
.....

7. List the main shortcomings/limitations (if any) that you have/had with past/existing approaches/programmes/interventions:

.....  
.....

8. Please, specify your criteria/requirements for the ideal management approach.

.....

9. Please indicate whether you do and at what intervals, compile a:

9.1. strategic plan.....

9.2. long-term plan (>5 yrs).....

9.3. medium-term plan (3-5 yrs) .....

9.4. short-term plan (1-3 yrs).....

9.5. operational plan ( 1 yr).....

9.6. List the steps in your planning process

.....  
.....  
.....  
.....  
.....



.....  
.....

10. Please indicate how and where the following steps are performed:

10.1. determination of the best achievable results.....

.....

10.2. formulation of objectives.....

.....

10.3. development of alternatives.....

.....

10.4. selection of the best alternative.....

.....

10.5. task and resources analysis.....

.....

10.6. performance standards.....

.....

10.7. cost determination.....

.....

10.8. determination of resources.....

.....

10.9. assessments of risks.....

.....





10.10. determination of posts.....

.....

10.11. delegation of accountability.....

.....

10.12. determination of the organisation structure.....

.....

10.13. determination of lines of authority.....

.....

10.14. determination of communication.....

.....

10.15. determination of job specifications.....

.....

10.16. determination of supervision schedules.....

.....

10.17. computerisation of planning.....

11. List the most important threats/limitations to your department

.....

12. In your department,

i) how do you develop managerial skills? .....

.....

ii) list the approaches/programmes/interventions and relevant level.

.....

13. With regard to your personal management development, please list the most important programmes you have attended and completed successfully:

i) internally .....

.....

ii) externally.....

.....

14. Do you, in your department, implement and enforce the policies set by the general manager of the mine?

.....

15. Please, indicate the percentage of time that you spend, on average over the long-term, on a scale of 0% to 100%, on your work as Head of your Department:

For completing this section the following definitions will apply:

Human work consists of management and technical work.

Management work refers to the execution of the management functions (planning, organising, leading and controlling and their respective activities.

Technical work refers to any other work that the manager performs in carrying out his duties.

Work	Percentage (%)										
	0	10	20	30	40	50	60	70	80	90	100
Planning											
- Strategic planning											
- Long-term planning											
- Medium-term planning											
- Operational planning											
- Budgeting											
Organising											
Leading											
Controlling											
Management work											
Technical work											
Total human work											

Thank you for your co-operation in completing this questionnaire. Kindly return it as specified in the cover letter.

MINE OVERSEERS LEVEL

**RESEARCH INFORMATION FOR PhD. DEGREE**

**COVER LETTER**

**Dear sir/madam**

I am currently conducting research into “**The Development Of a Comprehensive, Practical And Integrated Management Method With Specific Reference To The South African Mining Industry,**” as part of my PhD. studies at the University of Pretoria.

To this end I kindly request that you complete the following questionnaire. The completion of this questionnaire should not take more than 30 minutes of your time. Your response will be of the utmost importance to me.

As I may need to clarify some of your answers to the questions, I will appreciate it if you will be so kind as to enter your name and contact details in the spaces provided. Your cooperation in this regard is, however, voluntary. All information and personal detail will be treated as confidential. Kindly submit the completed questionnaire to your superior or e-mail it to the address stated below not later than 1 November 2004.

Should you have any queries or comments regarding this questionnaire, you are welcome to contact me personally at 072 282 5465. Alternatively, you can e-mail me at [jdspims@mweb.co.za](mailto:jdspims@mweb.co.za) or mail a hard copy of the completed questionnaire to P O Box 3703, Witbank, 1035.

Yours sincerely

J D Stone.

Prof. N van der Merwe  
Supervisor, UP.



**Section A: Background Information**

**Research: Practical Integrated Management Approach.**

When completing this section, please print if not e-mailing.

Date: 2004. .... Company/Mine.....

Name: .....Tel/Fax.....e-mail.....

Position.....

Educational qualifications: (Highest qualifications achieved at)

School: .....

College: .....

Technicon: .....

University: .....

Other: .....

Give a brief description of your training in the following areas:

Practical: .....

.....

Technical: .....

.....

.....

Management: .....

.....

.....

**Section B: Management Work**

Please answer the following questions by making a cross (x) in the relevant blocks provided.

Please note that in this research, the following definitions will apply:

A management approach is a general overall method/style of management, which encompasses all of the functions of management work.

A management programme is a programme, which is directed at the introduction or improvement of a specific management function or skill such as communication skills, negotiation skills, motivation skills etc.

A management intervention is a deliberate effort/input of relative short duration, introduced with the aim to either introduce, update or improve specific management performances and techniques such as safety improvement, cost reduction, improved human relations, higher productivity, zero based budgeting, activity based costing, linear programming etc.

Please use the following scale for assessment:

There are 5 columns indicating the following

Column 0 = No/Not/Never.

Column 1 = Seldom.

Column 2 = Sometimes.

Column 3 = Most of the time.

Column 4 = Yes/Always.

Example:

I give the correct instructions.

0	1	<del>2</del>	3	4
---	---	--------------	---	---

(You are then saying: " I sometimes give the correct instructions".)

Please complete the following:

1. I manage according to a specific management approach.

0	1	2	3	4
---	---	---	---	---

2. I am trained in the use of this management approach.

0	1	2	3	4
---	---	---	---	---

3. This management approach is based on management principles.

0	1	2	3	4
---	---	---	---	---

4. This management approach is applied on all levels.

0	1	2	3	4
---	---	---	---	---



5. This management approach allows total integrated management. 

0	1	2	3	4
---	---	---	---	---
6. I am trained to apply management principles. 

0	1	2	3	4
---	---	---	---	---
7. I understand my objective in the organisation. 

0	1	2	3	4
---	---	---	---	---
8. I know what results are required from me. 

0	1	2	3	4
---	---	---	---	---
9. I know how to achieve the required results. 

0	1	2	3	4
---	---	---	---	---
10. I have the authority to take the necessary decisions 

0	1	2	3	4
---	---	---	---	---
11. I accept accountability for the planning of the required results. 

0	1	2	3	4
---	---	---	---	---
12. I compile a long-term plan 

0	1	2	3	4
---	---	---	---	---
13. I compile a medium term plan. 

0	1	2	3	4
---	---	---	---	---
14. I compile an operational plan. 

0	1	2	3	4
---	---	---	---	---
15. I compile contingency plans. 

0	1	2	3	4
---	---	---	---	---
16. I compile project plans. 

0	1	2	3	4
---	---	---	---	---
17. I compile corrective action plans. 

0	1	2	3	4
---	---	---	---	---
18. I compile procedures. 

0	1	2	3	4
---	---	---	---	---
19. I compile emergency plans. 

0	1	2	3	4
---	---	---	---	---
20. My planning is initiated by my supervisor's request for specific results. 

0	1	2	3	4
---	---	---	---	---
21. I determine whether the required results are achievable. 

0	1	2	3	4
---	---	---	---	---
22. I list the most achievable results. 

0	1	2	3	4
---	---	---	---	---
23. I reach agreement with stakeholders on what results to plan for. 

0	1	2	3	4
---	---	---	---	---



24. I formulate the objective for the required results. 

0	1	2	3	4
---	---	---	---	---
25. I develop alternative methods to achieve the results required. 

0	1	2	3	4
---	---	---	---	---
26. I develop each alternative in a logical sequence of tasks 

0	1	2	3	4
---	---	---	---	---
27. I determine the required resources for each alternative. 

0	1	2	3	4
---	---	---	---	---
28. I schedule the time frame for each alternative. 

0	1	2	3	4
---	---	---	---	---
29. I compile the budget for each alternative. 

0	1	2	3	4
---	---	---	---	---
30. I select the best alternative. 

0	1	2	3	4
---	---	---	---	---
31. I plan for the selected alternative. 

0	1	2	3	4
---	---	---	---	---
32. I group tasks into meaningful posts. 

0	1	2	3	4
---	---	---	---	---
33. I delegate posts to sub-ordinates. 

0	1	2	3	4
---	---	---	---	---
34. My supervisor delegates work to me. 

0	1	2	3	4
---	---	---	---	---
35. I take sound decisions. 

0	1	2	3	4
---	---	---	---	---
36. There is an open channel of communication between my supervisor and me. 

0	1	2	3	4
---	---	---	---	---
37. There is an open channel of communication between my subordinates and me. 

0	1	2	3	4
---	---	---	---	---
38. My subordinates are trained to communicate with all relevant people. 

0	1	2	3	4
---	---	---	---	---
39. I motivate my subordinates. 

0	1	2	3	4
---	---	---	---	---
40. My supervisor motivates me. 

0	1	2	3	4
---	---	---	---	---
41. I have the right to select the people that work for me. 

0	1	2	3	4
---	---	---	---	---



42. I accept full accountability for the training of my subordinates. 

0	1	2	3	4
---	---	---	---	---
43. I exercise fair discipline. 

0	1	2	3	4
---	---	---	---	---
44. I develop performance standards for each task. 

0	1	2	3	4
---	---	---	---	---
45. I measure performance regularly. 

0	1	2	3	4
---	---	---	---	---
46. I evaluate actual performance against the standards. 

0	1	2	3	4
---	---	---	---	---
47. I correct deviations from the standards. 

0	1	2	3	4
---	---	---	---	---
48. I control the utilisation of equipment. 

0	1	2	3	4
---	---	---	---	---
49. I control the utilisation of company assets. 

0	1	2	3	4
---	---	---	---	---
50. I control strictly for the adherence to standards. 

0	1	2	3	4
---	---	---	---	---

**Section C: General**

1 Please indicate to what extent you make use of the following management techniques in your management:

- 1.1 Build specific procedures and processes into operations. 

0	1	2	3	4
---	---	---	---	---
- 1.2 Use time and method studies in setting detailed procedures. 

0	1	2	3	4
---	---	---	---	---
- 1.3 Make use of planning, organising, leading and controlling. 

0	1	2	3	4
---	---	---	---	---
- 1.4 Focus on the importance of relationships among people and productivity. 

0	1	2	3	4
---	---	---	---	---

2. List the most important approaches/programmes or interventions that you are using/used or were exposed to:

2.1. Management approaches:

i).....

ii).....





iii).....

2.2. Management programmes:

i).....

ii).....

iii).....

2.3. Management interventions:

i).....

ii).....

iii).....

3. In a few sentences can you please describe each of these approaches/programmes/  
interventions:

3.1. Management approaches

.....  
.....  
.....

3.2. Management programmes

.....  
.....

3.3. Management interventions

.....  
.....

4. Please, state the source(s), from which each approach/programme/intervention originated, e.g. abroad (USA), South Africa, in-house or departmental.

4.1. Management approaches

.....  
.....

4.2. Management programmes

.....  
.....

4.3. Management interventions

.....  
.....

5. Can you please state, where available, the:

5.1. Management approaches

- i). maintenance cost of each.....
- ii). contribution (R pay-off or other value) of each .....
- iii). duration or period of application.....
- iv). organisation level at which utilised .....

5.2. Management programmes

- i). maintenance cost of each.....
- ii). contribution (R pay-off or other value) of each .....
- iii). duration or period of application.....
- iii). organisation level at which utilised.....



5.3. Management interventions

i). maintenance cost of each.....

ii). contribution(R pay-off or other value) of each .....

iii). duration or period of application.....

iv). organisation level at which utilised.....

6. Which of these approaches/programmes/interventions are you still using in your department, for what reason(s), period, why and at which management level?

.....

7. List the main shortcomings/limitations (if any) that you have/had with past/existing approaches/programmes/interventions:

.....

8. Please, specify your requirements for the ideal management approach?

.....

9. Please list the steps in your planning process.

.....

.....

.....

.....

.....

.....

9.1. long-term planning.....

.....



9.2. short-term planning .....  
.....

9.3. operational planning.....  
.....

10. What are the most important challenges/opportunities facing your department?  
.....

11. List the most important threats to your department  
.....

12. In your department,  
i) how do you develop managerial skills? .....

.....  
ii) list the approaches/programmes/interventions and relevant level.  
.....

13. With regard to your personal management development, please list the most important programmes you have attended and completed successfully:

i). internally .....

ii). externally.....

14. Do you, in your department, implement and enforce the policies set by your superior?  
.....

15. Please, indicate the percentage of time that you spend, on average over the long-term, on a scale of 0% to 100%, on your work as Head of your Area:

For completing this section the following definitions would apply:

Human work consists of management and technical work.

Management work refers to the execution of the management functions (planning, organising, leading and controlling and their respective activities.

Technical work refers to any other work that the manager performs in carrying out his duties.

Work	Percentage (%)										
	0	10	20	30	40	50	60	70	80	90	100
Planning											
- Strategic planning											
- Long-term planning											
- Medium-term planning											
- Operational planning											
- Budgeting											
Organising											
Leading											
Controlling											
Management work											
Technical work											
Total human work											

Thank you for your co-operation in completing this questionnaire. Kindly return it as specified in the cover letter.



CHAMBER OF MINES OF SOUTH AFRICA



**OPERATING MINING GROUPS AND MINING COMPANIES**  
**MEMBERS OF THE CHAMBER OF MINES OF SOUTH AFRICA**

**BASE METALS**

**Anglo American Corporation of SA Ltd**

P O Box 61587  
2107 Marshalltown  
Tel: +27 11 634 9111  
Fax: +27 11 638 3221  
E-Mail: angloamerican.co.za

**Kumba Resources Limited**

P O Box 450  
0001 Pretoria  
Tel: +27 12 674 1000  
Fax: +27 12 674 1041  
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**Anglovaal Mining Limited**

P O Box 62379  
2107 Marshalltown  
Tel: +27 634 9111  
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**Kangra Group (Pty) Limited**

P O Box 2465  
2000 Johannesburg  
Tel: +27 11 643 7371  
Fax: +27 11 484 3024  
E-Mail: kangra.co.za

**Samancor Chrome**

P O Box 8186  
2000 Johannesburg  
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**Kuyasa Mining (Pty) Limited**

P O Box 4305  
1035 Witbank  
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**COAL MINING**

**Anglo Operations Limited**

P O Box 61587 Marshalltown  
Tel: +27 11 638 9111  
Fax: +27 11 638 3221  
E-Mail: coal.anglo.co.za

**DIAMOND MINING**

**De Beers Consolidated Mines Ltd**

P O Box X01  
Tel: +27 11 374 7000  
Fax: +27 11 374 7700  
E-Mail: debeersgroup.com

**Duiker Mining Limited**

P O Box 1146  
2000 Johannesburg  
Tel: +27 11 484 8485  
Fax: +27 11 484 2882  
E-Mail: jhb.diuker.co.za

**Trans Hex Group Limited**

P O Box 723  
Parow  
7499 Cape Town  
Tel: +27 21 931 1105  
Fax: +27 21 939 0711  
E-Mail: transhex.co.za

**Ingwe Coal Corporation Limited**

P O Box 618202107 Marshalltown  
Tel: +27 11 276 9111  
Fax: +27 11 838 7190  
E-Mail: ingwe.co.za  
E-Mail: ingwe.co.za

**GOLD MINING**

**African Rainbow Minerals & Exploration (Pty) Limited (ARM)**

9<sup>th</sup> Floor, Office Tower, Sandton City  
2146 Sandton  
Tel: +27 11 883 5606  
Fax: +27 11 883 5609  
E-Mail: armgold.com

**AngloGold Limited**

P O Box 62117  
2107 Marshalltown

**PLATINUM MINING**

**Anglo American Platinum Corporation Ltd**



Tel: +27 11 637 6000  
Fax: +27 11 637 6200/637 6108  
E-Mail: [anglogold.com](mailto:anglogold.com)

**Avgold Limited**

P O Box 62379  
2107 Marshalltown  
Tel: +27 11 634 9111  
Fax: +27 11 634 0038  
E-Mail: [avmin.co.za](mailto:avmin.co.za)

**Durban Roodepoort Deep Limited**

45 Empire Road  
2193 Parktown  
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Fax: +27 11 482 1022  
E-Mail: [potch.lia.net](mailto:potch.lia.net)

**Gold Fieds Limited**

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Private Bag X30500  
2041 Houghton  
Tel: +27 11 644 2400  
Fax: +27 11 644 2401  
E-Mail: [goldfields.co.za](mailto:goldfields.co.za)

**Harmony Gold Mining Co Limited**

Postnet Suite 27  
Private Bag x23  
2052 Gallo Manor  
Tel: +27 11 412 1450  
Fax: +21 11 692 3879  
E-Mail:

**Western Areas Limited**

P O Box 590  
2000 Johannesburg  
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Fax: +27 11 838 3393  
E-Mail: [jci.co.za](mailto:jci.co.za)

**IRON ORE MINING**

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Tel: +27 11 373 6111  
Fax: +27 11 838 5537 or 373 5111

[www.angloplat.com](http://www.angloplat.com)

**Barplats Platinum Limited**

Crocodile River Mine  
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0250 Brits  
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Fax: +27 1211 31812

**Impala Platinum Limited**

P O Box 61386  
2107 Marshalltown  
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Fax: +27 11 484 0340

E-Mail: [implats.co.za](mailto:implats.co.za)

**Lonmin Platinum Limited**

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2000 Johannesburg  
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Fax: +27 11 642 9717  
E-Mail: [lonplats.com](mailto:lonplats.com)

**Northam Platinum Limited**

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0380 Thabazimbi  
Tel: +27 1478 43 000  
Fax: +27 1538 50126  
E-Mail: [eoosthuizen@norplats.co.za](mailto:eoosthuizen@norplats.co.za)

**ASBESTOS MINING**

African Chrysotile Asbestos Limited  
P O B OX 1  
1307 Crysbestos  
Tel: +27 17 885 0080/5  
Fax: +27 13 1482 x X243

**INDUSTRIAL MINERALS**

**G and W Base and Industrial Minerals**

P O Box 14052  
1422 Wadeville  
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## OTHER

### **ASPASA (Aggregate and sand Producers' Association of SA)**

3rd floor, Chamber of Mines Building  
5 Hollard Street  
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Tel: +27 11 498 7265  
Fax: +27 11 498 7269  
E-Mail: [npienaar@bullion.org.za](mailto:npienaar@bullion.org.za)

### **O'Okiep Copper Co Limited**

P O Box 17, Nababeep, 8265  
Tel: +27 251 38121  
Fax: +27 251 38242

### **Pegmin (Pty) Limited**

Private Bag X3010, Phalaborwa, 1390  
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Fax: +27 11 614 1137

### **Audax Mining Corporation (Pty) Limited**

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Fax: +27 12 667 1828  
E-Mail: [hanlie@line-chem.co.za](mailto:hanlie@line-chem.co.za)

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E-Mail: [randgold.co.za](mailto:randgold.co.za)

### **RUC Holdings Limited**

P O Box 56, Albrton, 1450  
Tel: +27 11 861 0700  
Fax: +27 11 907 8396

### **Cementation (Africa Contracts) (Pty) Limited**

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Fax: +27 11 493 8293  
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### **Savuka Mining**

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### **Hanover Mining Holdings (Pty) Limited**

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E-Mail: [shaftsinkers.co.za](mailto:shaftsinkers.co.za)

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### **JCI Gold Limited**

Consolidated Building, Corner Fox and Harrison Streets, Johannesburg, 2001  
Tel: +27 11 373 9111  
Fax: +27 11 836 5724  
E-Mail: [jci.co.za](mailto:jci.co.za)





**Mineralco (Pty) Ltd**

P O Box 32086

Braamfontein, 2017

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E-Mail: [mineralco@sfco.co.za](mailto:mineralco@sfco.co.za)

**RCB January 2003**

**RESEARCH INFORMATION FOR PhD. DEGREE**

**COVER LETTER**

**Dear sir/madam**

I am currently conducting research into **“The Development Of a Comprehensive, Practical And Integrated Management Method With Specific Reference To The South African Mining Industry,”** as part of my PhD. studies at the University of Pretoria. To this end I kindly request that you complete the following questionnaire. The completion of this questionnaire should not take more than 20 minutes of your time. Your response will be of the utmost importance to the Mining Industry and to this study.

Personally, I have been in a managerial position in the Mining Industry for more than 30 years. My experience, until retirement, was that the available and legally required management approaches were inadequate to enable management to manage on a comprehensive, realistic and practical basis. Therefore, management had to introduce expensive short-term management development programs and interventions on a regular basis sometimes with limited and questionable results. I have researched for many years into the practicality of existing management approaches and concluded that there exists no single approach that will fulfil in management’s needs on a long-term comprehensive basis. I am convinced that I have eventually developed a management approach that will fulfil completely in management’s legitimate needs.

As I may need to clarify some of your answers to the questions, I will appreciate it if you will be so kind as to enter your name and contact details in the spaces provided. Your cooperation in this regard is, however, voluntary. All information and personal detail will be treated most confidentially at all times. Should you have any queries or comments regarding this questionnaire, you are welcome to contact me personally at 072 282 5465. Alternatively, you can e-mail me at [jdspims@mweb.co.za](mailto:jdspims@mweb.co.za). Kindly e-mail your completed questionnaire directly to me to the address below as soon as possible but not later than.....Please enter your contact details in the spaces below:

Name:.....Mine:.....Position: e-mail:.....  
Tel/fax:..... Postal address:

Yours sincerely  
J D Stone.

Prof N van der Merwe,  
Supervisor, UP.

In answering the questions, below, please use the following assessment scale.

Please use the following assessment scale:

Column 0 = No/Not/Never, Column 1 = Seldom, Column 2 = Sometimes

Column 3 = Most of the time, Column 4 = Yes/Always.

Example:

I give the correct instructions.

0	1	<del>2</del>	3	4
---	---	--------------	---	---

You are then saying:” I sometimes give the correct instructions”.

The Mine Managers’ Certificate of Competency (the well-known Government Ticket) is a legal requirement for a mine manager to be appointed in an accountable position. To what extent does the management theory of this certificate, enable you to:

1. forecast the most probable results?

0	1	2	3	4
---	---	---	---	---

2. state the most probable achievable results?

0	1	2	3	4
---	---	---	---	---

3. formulate the realisable objectives?

0	1	2	3	4
---	---	---	---	---

4. develop alternative methods?

0	1	2	3	4
---	---	---	---	---

5. develop the work flow for each alternative method?

0	1	2	3	4
---	---	---	---	---

6. determine the tasks and resources for each alternative?

0	1	2	3	4
---	---	---	---	---

7. schedule the work flow for each alternative method?

0	1	2	3	4
---	---	---	---	---

8. compile the budget for each alternative method?

0	1	2	3	4
---	---	---	---	---

9. select the best method?

0	1	2	3	4
---	---	---	---	---

10. determine and assess all risks?

0	1	2	3	4
---	---	---	---	---

11. develop the necessary policies and procedures?

0	1	2	3	4
---	---	---	---	---

12. computerise your total plan?

0	1	2	3	4
---	---	---	---	---

13. determine the job specifications or requirements?

0	1	2	3	4
---	---	---	---	---



14. develop the necessary posts?

0	1	2	3	4
---	---	---	---	---

15. delegate accountability to each post?

0	1	2	3	4
---	---	---	---	---

16. develop the best organizational structure?

0	1	2	3	4
---	---	---	---	---

17. determine the lines of authority?

0	1	2	3	4
---	---	---	---	---

18. determine communication lines?

0	1	2	3	4
---	---	---	---	---

19. create the necessary relationships among posts?

0	1	2	3	4
---	---	---	---	---

20. affect proper coordination?

0	1	2	3	4
---	---	---	---	---

21. determine supervisory schedules?

0	1	2	3	4
---	---	---	---	---

22. determine supervisory accountabilities?

0	1	2	3	4
---	---	---	---	---

23 select the most competent people available?

0	1	2	3	4
---	---	---	---	---

24 develop realistic training and management development schedules?

0	1	2	3	4
---	---	---	---	---

25 develop the necessary performance standards for each task?

0	1	2	3	4
---	---	---	---	---

26. measure work in progress and completed?

0	1	2	3	4
---	---	---	---	---

27. evaluate performance?

0	1	2	3	4
---	---	---	---	---

28. correct deviations from standards?

0	1	2	3	4
---	---	---	---	---

29. To your judgement, what are the main shortcomings, if any, of this management theory?

.....

.....

.....

.....

.....



.....

30. List any suggestions to improve this theory and to eliminate the shortcomings:

.....

.....

.....

.....

.....

.....

.....

.....

Thank you for completing this questionnaire.

**RESEARCH INFORMATION FOR PhD. DEGREE: COVER LETTER**

**Dear sir/madam**

I am currently conducting research into **“The Development Of a Comprehensive, Practical And Integrated Management Method With Specific Reference To The South African Mining Industry,”** as part of my PhD. studies at the University of Pretoria. To this end I kindly and urgently request you to complete the following short questionnaire, which should not take more than 20 minutes of your valuable time. Your response will be of the utmost importance to the Mining Industry and to this study and will be highly appreciated by me. Personally, I have been in a managerial position in the Mining Industry for more than 30 years. My experience, until retirement, was that the available and legally required management approaches were inadequate to enable management to manage on a realistic comprehensive, integrated and practical basis. Therefore, management utilised and is still using expensive short-term management development programs and interventions. These are used on a regular basis sometimes with limited and questionable results. I have researched for many years into the practicality of existing management approaches and concluded that there exists no single approach that will fulfil in management’s needs on a long-term comprehensive basis. I am convinced that I have eventually developed a management approach that will comply completely with management’s legitimate requirements.

As I may need to clarify some of your answers to the questions, I will appreciate it if you will be so kind as to enter your name and contact details in the spaces provided. Your cooperation in this regard, however, is voluntary. All information and personal detail will be treated most confidentially at all times. Kindly e-mail your completed questionnaire directly to me to the address below as soon as possible but not later than .....Should you have any queries or comments regarding this questionnaire, you are welcome to contact me personally at 072 282 5465. Alternatively, you can e-mail me at [jdspims@mweb.co.za](mailto:jdspims@mweb.co.za). mail a hard copy of the completed questionnaire to P O Box 3703, Witbank, 1035 or fax the completed questionnaire to 013 656 1071. I would like to request that you complete this questionnaire. Please enter your contact details in the spaces below:

Name:.....Position/Title: .....Mine/Group:.....  
Minerals/mined.....e-mail.....  
Tel/fax.....Postal/address:.....

Yours sincerely

J D Stone.

Prof N van der Merwe, Supervisor, UP.

**QUESTIONNAIRE**

1. Does the management approach that you and the mine utilise mainly consist of the management functions of planning, organising, leading and controlling (PLOC)?  
.....Yes/No

2. Should you not use the above management approach, please briefly specify and describe the approach you do use:

.....

.....

Please use the following assessment scale:

Column 0 = No/Not/Never, Column 1 = Seldom, Column 2 = Sometimes

Column 3 = Most of the time, Column 4 = Yes/Always

Example:

I give the correct instructions.

0	1	<del>2</del>	3	4
---	---	--------------	---	---

You are then saying:” I sometimes give the correct instructions”.

To what extent does the management theory of the management approach that you use, enable you to?:

1. forecast the most probable results?

0	1	2	3	4
---	---	---	---	---

2. state the most probable achievable results?

0	1	2	3	4
---	---	---	---	---

3. formulate the realisable objectives?

0	1	2	3	4
---	---	---	---	---

4. develop alternative methods?

0	1	2	3	4
---	---	---	---	---

5. develop the work flow for each alternative method?

0	1	2	3	4
---	---	---	---	---

6. determine the tasks and resources for each alternative?

0	1	2	3	4
---	---	---	---	---

7. schedule the work flow for each alternative method?

0	1	2	3	4
---	---	---	---	---

8. compile the budget for each alternative method?

0	1	2	3	4
---	---	---	---	---

9. select the best method?

0	1	2	3	4
---	---	---	---	---



- 10. determine and assess all risks? 

0	1	2	3	4
---	---	---	---	---
  
- 11. develop the necessary policies and procedures? 

0	1	2	3	4
---	---	---	---	---
  
- 12. computerise your total plan? 

0	1	2	3	4
---	---	---	---	---
  
- 13. determine the job specifications or requirements? 

0	1	2	3	4
---	---	---	---	---
  
- 14. develop the necessary posts? 

0	1	2	3	4
---	---	---	---	---
  
- 15. delegate accountability to each post? 

0	1	2	3	4
---	---	---	---	---
  
- 16. develop the best organizational structure? 

0	1	2	3	4
---	---	---	---	---
  
- 17. determine the lines of authority? 

0	1	2	3	4
---	---	---	---	---
  
- 18. determine communication lines? 

0	1	2	3	4
---	---	---	---	---
  
- 19. create the necessary relationships among posts? 

0	1	2	3	4
---	---	---	---	---
  
- 20. affect proper coordination? 

0	1	2	3	4
---	---	---	---	---
  
- 21. determine supervisory schedules? 

0	1	2	3	4
---	---	---	---	---
  
- 22. determine supervisory accountabilities? 

0	1	2	3	4
---	---	---	---	---
  
- 23. select the most competent people available? 

0	1	2	3	4
---	---	---	---	---
  
- 24. develop realistic training and management development schedules? 

0	1	2	3	4
---	---	---	---	---
  
- 25. develop the necessary performance standards for each task? 

0	1	2	3	4
---	---	---	---	---
  
- 26. measure work in progress and completed? 

0	1	2	3	4
---	---	---	---	---
  
- 27. evaluate performance? 

0	1	2	3	4
---	---	---	---	---
  
- 28. correct deviations from standards? 

0	1	2	3	4
---	---	---	---	---





29. To your judgement, what are the main shortcomings, if any, of this management theory?

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30. List any suggestions to improve this theory and to eliminate the shortcomings:

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Thank you for completing this questionnaire.

**QUESTIONNAIRE**

**Appendix 9**

**TIME UTILISATION DURING PLANNING AND NORMAL TIMES: Nov. 2004 – June 2005**

Completed by the researcher after the scheduled discussions in order to assess the percentage time spent by management respondents on the management functions. In this questionnaire the following definitions are applicable:

Management work refers to the execution of the management functions (planning, organising, leading and controlling and their respective activities.

Technical work refers to any other work that the manager performs in carrying out his duties.

Work refers to the total (management plus technical) work per day that the manager performs in order to achieve the results required from him

Work	Percentage time (%)	
	Normal time	Planning period
Planning		
- Strategic planning		
- Long- term planning		
- Operational planning		
- Budgeting		
Organising		
Leading		
Controlling		
Management work total		
Technical Work		
Total time		

The total normal shift time (eight hours) per day cannot be more or less than 100 per cent per day.

Completed by: ..... Date: .....