

The Application of Viable System Model (VSM) in the context of establishing, maintaining and restoring a Culture of Learning, Teaching and Service (COLTS) in a school: An Organizational setting.

BY

ZANDILE FLORENCE NHLABATHI

Submitted in partial fulfilment of the
Requirements for the degree of
Master of Commerce in Organizational and Management Systems
In the Faculty of Management Studies,
University of Natal, Durban

December 2001

DECLARATION

I declare that this dissertation: " The Application of Viable System Model (VSM) in the context of establishing, maintaining and restoring a Culture of Learning, Teaching and Service (COLTS) in a School - An organisational setting", is my own work, that all the sources used or quoted have been indicated and acknowledged by means of complete references.

Z.F.NHLABATHI

ACKNOWLEDGEMENTS

For the expert guidance and constant support I thank Prof. R.G.Taylor, Co-ordinator and Course Advisor who was generous with his time, interest and patience to help me complete this dissertation.

Special thanks go to the following people, my colleagues Teboh Mofokeng, Lindelwa Dakada-Shaingca, Khulekani Gazu, Xolani Ntombela and the Mgitshwa Management Team. Also my cousin Angel Zondi-Siyaca.

I am particularly thankful to my father, Arthur R. Mnyandu who encouraged me to carry on even during trying times, though he could not live to see this dissertation submitted for examination, but his spirit is continuing supporting me.

Also, I owe a collective debt of gratitude to my mother, Fakazile and grandmother, Nomakhosi whose constant support and lifelong encouragement have been instrumental throughout the years.

I gratefully acknowledge the support, affection and patience I received from my life partner, husband Boni who has been instrumental in that I complete this enormous task.

ABSTRACT

The establishment, restoration, enhancement and maintenance of the Culture of Learning, Teaching and Service (COLTS) in a school, remains a precondition for a successful Education System. Colts aims at restoring functionality in the schools with the view to improve the quality of learning and teaching activities. The COLTS campaign programmes were launched in February 1997 by the then President Mandela, to promote a culture of learning, teaching and service in every institution in the country. From the National to Circuit level the focus is directly or indirectly devoted to the Culture of Learning, Teaching and Service in a school. The Culture of Learning, Teaching and Service promotes the idea that it is the duty of educators to teach and of learners to learn.

The question is how Learning, Teaching and Service structures, processes ensure viability with the application of a Viable System Model (VSM) in a school. The Viable System Model is a powerful diagnostic tool to promote viability in an organization. Therefore, the Viable System Model is applied as a methodology for understanding structures and processes of learning and teaching in a school. The application of a Viable System Model in the context of learning and teaching is used as a consistent intervention tool to develop the organizational competence.

The application of a Viable System Model as an intervention tool in managing the Culture of Learning, Teaching and Service becomes a powerful learning experience or challenge for schools. The core business of any school-

organization is learning and teaching; thus its mechanisms for identity and viability determine survival and success. This demands that the learning and teaching programmes or approaches need to adapt to the changing environment and the new approaches require a new way of thinking, research and learning.

Therefore, the Viable System Model is applied as a methodology that is capable of improving performance in a school as an organization. It is used as a diagnostic tool to check the culture of learning, teaching and service structures and processes to ensure viability and effectiveness. The culture of learning, teaching and service context explores the usefulness of VSM in dealing with complex situations in the organization. The aim is to use a Viable System Model to improve synergy between learning and teaching autonomy of parts and the whole school. It is hoped that the usefulness a of Viable System Model in the culture of learning, teaching and service context will develop a school's competence.

The restoration of COLTS is a challenge to both the Education System and school community. The VSM is applied at different levels of COLTS to make specific recommendations, taking into consideration the internal and external environment. The VSM theory is used to pinpoint the various systemic or structural constraints within and outside the school. For schools to succeed as adaptive goal-seeking entity, they need understanding and application of VSM.

The relevance of VSM theory such as the idea of recursion, cybernetic principles and arrangement of functions at different levels provide organizations

with flexibility they need to survive in complex changing environments. Through the application of a Viable System Model, schools are encouraged to learn and understand how change unfolds through circular patterns of interaction rather than linear patterns.

The discord or common faults, constraints and harmonising elements in the COLTS scenario reveal that the relationship between school and the environment should be understood as ongoing processes that need to be maintained. Therefore, the COLTS activities should meet the business idea of the organization and the principles of viability. To achieve learning and development in COLTS context, schools need to practice new behaviour skills and integrate new skills into new ways of thinking and doing. The school has to seize the opportunities created by the process of using a Viable System Model as a tool for maintaining COLTS in school.

In conclusion, personal living model and the Toulmin Argument Model are included as part of systematic management, reflection and learning experiences. The models are a self-reflective process of how I can deal with COLTS issue in my organization which becomes an on - going process for personal and school as an organization to develop into new thinking horizons in COLTS context.

TABLE OF CONTENTS

CHAPTER 1	PAGE
ORIENTATION TO THE STUDY	
1.1. INTRODUCTION TO THE STUDY.....	1
1.2. STATEMENT OF THE PROBLEM.....	3
1.3. BACKGROUND TO THE STUDY.....	4
1.4. AIM OF THE STUDY.....	7
1.5 KEY CONCEPTS.....	8
1.5.1. SYSTEM.....	8
1.5.2. VIABLE SYSTEM.....	8
1.5.3. VIABLE SYSTEM MODEL.....	9
1.5.4. ORGANIZATION.....	9
1.5.5. CYBERNETICS.....	10
1.5.6. VIABLE SYSTEM DIAGNOSIS (VSD).....	10
1.5.7. STRUCTURE.....	10
1.5.8. CULTURE OF LEARNING, TEACHING AND SERVICE (COLTS).....	11
1.5.9. RECURSION.....	11
1.6. ORGANIZATION OF THE DISSERTATION.....	11
1.7. CONCLUSION.....	13

CHAPTER 2

LITERATURE REVIEW

2.1. INTRODUCTION.....	14
2.2. AN OVERVIEW OF VSM.....	14
2.2.1. THE FIVE KEY SYSTEMS OF A VIABLE SYSTEM MODEL.....	20
2.2.1.1. SYSTEM ONE-IMPLEMENTATION.....	20
2.2.1.2. SYSTEM TWO-CO-ORDINATION.....	21
2.2.1.3. SYSTEM THREE-CONTROL.....	22
2.2.1.4. SYSTEM FOUR -INTELLIGENCE.....	23
2.2.1.5. SYSTEM FIVE-POLICY.....	24
2.3.1. THREE BASIC LAWS OF CYBERNETICS.....	27
2.3.2. SELF-ORGANIZING SYSTEMS LAW.....	27
2.3.3. FEEDBACK SYSTEMS LAW.....	28
2.3.4. THE LAW OF REQUISITE VARIETY.....	29
2.3.5. WHY DO SCHOOL ORGANIZATIONS NEED VSM.....	30
2.4. MECHANISMS FOR VIABILITY.....	32
2.4.1. THE ADAPTATION OR POLICY-MAKING MECHANISM.....	33
2.4.2. THE CONTROL MECHANISM.....	37
2.5. A SUMMARY OF USEFULL MODELS IN THE DISSERTATION.....	39
2.5.1. THE BUSINESS IDEA MODEL OF THE ORGANIZATION.....	40
2.5.2. PERSONAL MODEL FOR SYSTEMATIC MANAGEMENT AND COLTS MAINTENANCE.....	40

2.5.3. THE TOULMIN ARGUMENT MODEL.....	41
2.5.4. FLUX (CHANGE) APPROACH MODEL.....	42
2.6. CONCLUSION.....	43

CHAPTER 3

THE PROCESS OF USING VIABLE SYSTEM MODEL IN THE CONTEXT OF ESTABLISHING, MAINTAINING AND RESTORING: A CULTURE OF LEARNING, TEACHING AND SERVICE IN A SCHOOL: AN ORGANIZATIONAL SETTING

3.1. INTRODUCTION.....	44
3.2. IDENTIFICATION OF AN ORGANIZATIONAL ISSUE - COLTS.....	54
3.3. HOW I PERCEIVE MY ROLE IN THE ORGANIZATION IN THE LIGHT OF UNDERSTANDING VSM.....	47
3.4. THE BUSINESS IDEA OF THE ORGANIZATION.....	52
3.5. THE PROCESS OF USING VSM IN AN ORGANIZATIONAL ISSUE (COLTS).....	54
3.5.1. COLTS VIABLE SYSTEM MODEL	55
3.5.2. SYSTEM ONE A-D.....	56
3.6. WHAT CONSTRAINTS ARE IMPOSED UPON EACH PART OF SYSTEM ONE BY MANAGEMENT.....	58
3.7. ACCOUNTABILITY.....	60

3.8. SYSTEM TWO-COMPONENTS.....	61
3.8.1. ELEMENTS WITH HARMONISING EFFECT.....	61
3.9. SYSTEM THREE-COMPONENTS.....	62
3.10. SYSTEM FOUR-COMPONENTS.....	62
3.11. SYSTEM FIVE -COMPONENTS.....	63
3.12. THE COMMON FAULTS FOUND IN A SCHOOL.....	64
3.13. CONCLUSION.....	65

CHAPTER 4

**USEFULNESS OF VSM AS AN INTERVENTION TOOL
(METHODOLOGY) IN AN ORGANIZATIONAL ISSUE OF COLTS IN AN
EDUCATIONAL INSTITUTION: SCHOOL**

4.1. INTRODUCTION.....	66
4.2. USEFULNESS OF VSM THEORY IN COLTS CONTEXT IN SCHOOL ...	67
4.3. HOW CAN VSM AND COLTS (THEORY AND PRACTICE) REFLECTION BE USED AS A SOURCE OF LEARNING AND DEVELOPMENT IN A SCHOOL	73
4.4. HOW COULD VSM THEORY BE MODIFIED TO IMPROVE ITS RELEVANCE	78
4.5. PERSONAL LONG MODELS FOR SYSTEMATIC MANAGEMENT AND COLTS MAINTENANCE.....	80

4.5.1. CHANGE INTERVENTION: APPLICATION OF VSM IN COLTS	81
4.5.2. MAINTAINING COLTS IN SCHOOL: THE TOULMIN ARGUMENT MODEL	82
4.6. CONCLUSION.....	83

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1. INTRODUCTION.....	85
5.2. CONCLUSIONS ON VIABLE SYSTEM MODEL AS USEFUL METHODOLOGY.....	85
5.3. CONCLUSIONS ON COLTS AND VSM RELATIONSHIP.....	88
5.4. CONCLUSIONS ON IMPORTANT LESSONS OF THE STUDY.....	91
5.5. RECOMMENDATIONS ON COLTS - AN ORGANIZATIONAL ISSUE... ..	94
REFERENCES.....	96

CHAPTER ONE

ORIENTATION TO THE STUDY

1.1 INTRODUCTION TO THE STUDY

The organizational setting is that of establishing, maintaining and restoring a Culture of Learning, Teaching and Service in a school (COLTS). A Culture of Learning, Teaching and Service is a mechanism to bring massive visibility, viability, urgency, participation to the ministry and stakeholders commitment to educational quality throughout the Education system. The main purpose of a school's existence is to enable learning, teaching and service to take place. The key values of learning and teaching process include consciousness, behaviour, discipline, support services, community ownership and excellence.

Therefore, Department officials, school managers, educators, learners and stakeholders need to focus their vision and goals on promoting a high standard of learning, teaching and service in a school. In offering quality service, the school has to change into new approaches such as new school policies, code of conduct, new curriculum, continuous assessment, restoring COLTS and whole school development. This new way of working requires a new way of thinking, action, research and learning by the school community.

In the light of the above, a Viable System Model (VSM) is used as the methodology for understanding COLTS processes so that the performance of the school is improved. The VSM is used as a diagnostic tool where an organization being analyzed is compared to the VSM check, so that its structures and processes are to ensure viability and effectiveness. Espejo & Schwaninger (1993) maintain that an effective organization is one that not only does things right, but is also able to find the right things to do. This Capacity for adaptation of the mission and identity of the organization is normally associated with its strategic levels of management.

Application of VSM in the context of COLTS will include system one to system five being guided by system identification and system diagnosis. The Viable System Model is used to diagnose problems of the organization, hence the term viable system diagnosis (VSD).

The dissertation will explore the usefulness of VSM as a model that is capable of dealing with parts of the organization, both vertically and horizontally interdependent. The idea of recursion enables the VSM to cope with interdependence displayed in the Education System, which embrace departments. The VSM theory will be utilized in understanding the learning and teaching processes. A viable system model of COLTS from system one to system five will be identified and diagnosed. The VSM theory and COLTS practices will present how to promote organizational efficiency and viability to the changing environments. Thus, COLTS as a

tool in an effort to improve the quality of education will also be analyzed with VSM check to ensure viability in the organizational setting.

1.2 STATEMENT OF THE PROBLEM

The establishment, restoration, enhancement and maintenance of the culture of learning, teaching and service (COLTS) in a school, is a precondition of a successful Education system. From the national level down to circuit level the focus is directly or indirectly devoted to the COLTS task in schools. COLTS primarily focus on the idea that it is the duty of educators to teach and of learners to learn (South African Education Charter, 1998). But there are fundamental requirements for COLTS that involve obligations and actions on the part of many stakeholders or role players, which support the work of teachers and learners and provide better conditions for them to do learning and teaching activities.

The study seeks to use VSM in COLTS context to present:

1. How COLTS structures and processes ensure viability in a school with the application of VSM. How teams and departments in COLTS participate and promote functionality in a school. How learning and teaching activities respond to the change, maintain a balance between the external and internal school environment.

2. Do COLTS mechanisms for identity and viability determine survival and business in a school. Whether COLTS activities move along the intended direction and lead to the required results.
3. How COLTS context explores the usefulness of VSM in dealing with complex situations in the organization.
4. Applying VSM theory in COLTS activities (learning and teaching, continuous assessment, school policies and whole school development) to find synergy between the combination of the separate parts and the entire school. Whether COLTS activities have capacity to manage its own problems and at the same time keep the integrity of the school.
5. Of what relevance is VSM theory in providing schools with flexibility they need to survive in complex changing environments.
6. How schools could seize the opportunities created and revealed by the process of VSM as a tool for maintaining COLTS.
7. Whether the use of VSM as a consistent tool in COLTS context enable schools to develop competence.
8. What tools VSM theory and COLTS practice can provide as a source of learning, reflection and development in a school?

1.3 BACKGROUND TO THE STUDY

The COLTS campaign programmes were launched in February 1997 by President Nelson Mandela, to promote a culture of learning, teaching and service in every learning institution throughout the country. The

Department of Education is committed to a three-year campaign that started in March 1999 and will end in March 2002 with the view to have sustainable programmes. Colts Working Document (1997) spells out that COLTS is not a substitute for educational programmes of the Department, but is a vanguard activity which mobilizes professional and non professional energies, so as to accelerate the key values of education programmes. According to the Education Programmes Directorate Provincial meeting held in Truro House, 18 March 1999, five focus areas were identified for COLTS:

- > Discipline, commitment and excellence among learners and educators: this is all teachers and learners component that expects teachers to teach a full day, a full five-day week and a full term. All teachers to prepare for all their classes and mark all their pupils' work. All learners to attend the school for a full day, a five-day week and a full-term. All learners to complete all their assignments and homework.
- > Transformation effected through functioning of governing bodies: this is - we make our schools work for us component. All governing bodies elected should work, receive capacity-building, dedicate themselves to the improvement of learning, actively support all teachers and learners and commit themselves to cater for and improve their schools.
- > The provision of basic resources: these concentrate on that - all schools are guaranteed at least the minimum package of learning resources, furniture and equipment to facilitate teaching and learning.

adopt the South African Education Charter. In the Education Charter Project, there is also dedication to learning and teaching.

- > The creation of crime and violence free learning environments: this is part of no crime in schools component - which states that all schools should ban weapons and build solidarity to enforce the ban. All schools ban drugs and enforce solidarity to enforce the ban. All schools ban trashing and vandalism and build solidarity to enforce the ban. All schools build commitment to human rights for all.

The South African Education Charter (March 1998) reveals that one of the key challenges facing the education system is lack of dedication to learning and teaching. The school days are often disrupted by late coming, truancy and lack of commitment by learners. The lack of students commitment is complimented by a similar absence of professional commitment to educate among educators, teacher truancy and late coming. This undermines quality education and makes the achievement of the culture of learning and teaching elusive. Thus, COLTS activities focus on eliminating hostile learning environments and promote safe, peaceful learning and teaching environments.

COLTS intends to bring together multiple role players and utilize multiple methodologies for achieving its aims. In the words of the Ministry of Education's first White Paper on Education and Training: "It is now the joint responsibility of all South Africans who have a stake in the education and training system to help build a just, equitable and high quality system for all the citizens, with a common culture of disciplined commitment to

learning and teaching" (Education and Training in a Democratic South Africa: First Step to Develop a New System, March 1995).

AIMS OF THE STUDY

The purpose of the study is to explore the usefulness of VSM as a model that is capable of dealing with complex and dynamic systems that are both vertically and horizontally interdependent within the COLTS context in a school. The idea of recursion in VSM is observed so that it can cope with the interdependence displayed in the Education System. The VSM as a methodology is applied at different system levels of COLTS as a diagnostic tool to make specific recommendations for improving the performance in school. The application of VSM in the context of COLTS will include system one to system five being guided by system identification and system diagnosis. The study will review the VSM theory to improve its relevance to COLTS context in a school. The study aims at using VSM as the methodology for understanding and improving the synergy between autonomy of the parts and integration of the whole in a school.

VSM is used as a systems methodology that can pinpoint various systemic or structural constraints in a school, helping it to succeed as an adaptive and goal-seeking entity. The application of VSM in the context of COLTS is significant, because the study is geared to tackle integrated activities, providing insight into the design of appropriate management-information,

decision-support system and organization-environment. Beer (1979) maintains that the VSM's coherent cybernetic principles are useful in monitoring viability of the organization.

1.5 KEY CONCEPTS

The following terms are relevant to the study:

1.5.1 System

A system is a set or collection of elements that are interrelated, these elements, relationships and the whole system have to be imagined by people and tested against reality to serve our purposes (Ackoff, 1971).

1.5.2 VIABLE SYSTEM

This refers to that system that is able to maintain a separate existence and has its own problem solving capacity (Beer, 1984). For a system to survive, it needs not only the capacity to respond to familiar events, but the potential to respond to unexpected, previously unknown events, such as the advent of new technologies or competitor initiatives. The hallmark of viable systems, is their capacity to adapt to changing environments. Clemson (1984) stresses the viability principle as a function of the balance maintained along two dimensions. Firstly, autonomy of sub-system versus integration of the system as a whole. Secondly, stability versus adaptation. The implication is that for a system to be viable it needs to adapt on short-term basis, but keep integrity (ethical) in the longterm.

The implication is that for a system to be viable it needs to adapt on short-term basis, but keep integrity (ethical) in the long term.

1.5.3 VIABLE SYSTEM MODEL

As its name suggests, it is a model of the organizational features of any viable system (Beer, 1972). According to Syncho and Associates (1992) it is a powerful descriptive and diagnostic tool to map management capacities and promote viability.

1.5.4 ORGANIZATION

The term can be applied to any group of people who are in stable interaction over time and develop an identity of their own. It is a set of relationships between people that allows them to operate as a cohesive whole, (Senge 1992). However, Argyris (1978) defines organizations as closed networks of multiple interrelationships between people. Morgan (1989) states that relationships are the outcome of direct and indirect communication that occurs between people over time. It is the relationships between parts of the organization that provides the organization with its identity. According to Senge (1992), organizations of all kinds have no inherent purposes of their own. It is only people, in interaction with one another, who can ascribe a purpose to an organization. By reaching agreement through communications of all kinds, about the purpose of the organization, they can focus their efforts more

1.5.5 CYBERNETICS

Cybernetics refers to the science of effective organization. It is concerned with the general patterns, laws and principles of behaviour that characterize complex, dynamic, probabilistic, integral and open systems (Jackson, 1989). Boyd (1981) refers to cybernetics as a theory that treats the ways of behaving; thus it is essentially functional and behavioristic. Yet, Norbert Wiener, who is generally accorded the title of the father of cybernetics, defines it as the science of effective communication and control in man and machine.

1.5.6 VIABLE SYSTEM DIAGNOSIS (VSD)

This refers to the use of a Viable System Model for diagnosing problems of organization. The VSD has cybernetics principles that underpin this approach. Clemson (1989) concludes that when organizations do not perform well it is assumed that cybernetics principles are violated.

1.5.7 STRUCTURE

In this study, structure incorporates the various roles that people adopt, the units (e.g. teams, departments, business units) in which they participate, the resources which they employ in relating to each other. The organization's structure is viewed as a network of real life interactions, not as a static set of formal hierarchical and functionally reporting relationships.

organization's structure is viewed as a network of real life interactions, not as a static set of formal hierarchical and functionally reporting relationships.

1.5.8 CULTURE OF LEARNING, TEACHING AND SERVICE (COLTS)

COLTS refers to the norm of teaching learners by educators and learners committed to learning in a school environment (Working Document on COLTS, 1997). The COLTS programmes aim at restoring functionality in the schools with the view to improve the quality of learning and teaching. A Culture of Learning, Teaching and Service is a mechanism to bring massive visibility, viability, urgency, participation to the Ministry and stakeholders commitment to educational quality throughout the system. Colts provides a focus on the key values of the education process for example discipline, determination to succeed, mutual support and community ownership.

1.5.9 RECURSION

Jackson (1989) defines recursion as the replication of the same patterns or relationships at different levels or scales in the organization or structure of the model replicated in each of its parts.

1.6 ORGANIZATION OF THE DISSERTATION

The dissertation will have five Chapters, including this introductory chapter.

Chapter two is a literature review, and it gives an overview of VSM theory, basic laws of cybernetics, why an organization like a school needs this intervention tool, philosophy and principles of Viable system diagnosis, useful models and mechanisms for viability.

Chapter three explores an organizational issue of COLTS by using the VSM as a methodology that could help the school in its endeavours of maintaining a culture of learning, teaching and service. The elements mapping harmony effect and those with faults or discord revealed by the process of applying VSM in the COLTS context will be presented.

Chapter four concentrates on the usefulness of VSM in promoting COLTS and transforming a school into a viable organization. The theory part of VSM and the practical part of COLTS is analyzed and synthesized to create synergy between departments and the whole school as a viable organization.

Chapter five focuses on summary, conclusions and recommendations of the study. The conclusions focus on VSM as a useful methodology, COLTS and VSM relationship and important learning points or lessons in the process of the application of VSM in COLTS. Recommendations on COLTS as an organizational issue are also included in chapter five.

CHAPTER TWO

LITERATURE REVIEW

INTRODUCTION

Chapter two gives a theoretical background or literature survey on VSM as a methodology that can be utilized in understanding an organizational issue of COLTS in a school. The basic laws of cybernetics especially the law of requisite variety on which VSM is based is explained. The relevance of VSM in a school - organization is highlighted. The useful models to be used in the dissertation are included. Finally, it focuses on the mechanisms of viability concerned with strategic levels of management in an organization.

AN OVERVIEW OF VSM

A viable system model is a model of the organizational features of any viable model. According to Beer (1972), a system is viable if it is capable of responding to environmental changes even if those changes could not have been foreseen at the time the system was designed. The VSM is an arrangement of five functional elements that are interconnected through a complex of information and control loops. The emphasis is on recursion that represents, for example, an organization and its departments of which it may also be a functional part. The VSM works on principles of structural recursion, where systems emerge from, and are composed of, a series of sub-systems, each having self-regulating and self-organizing characteristics. The VSM can be used for diagnosing problems of

CHAPTER TWO

LITERATURE REVIEW

INTRODUCTION

Chapter two gives a theoretical background or literature survey on VSM as a methodology that can be utilized in understanding an organizational issue of COLTS in a school. The basic laws of cybernetics especially the law of requisite variety on which VSM is based is explained. The relevance of VSM in a school - organization is highlighted. The useful models to be used in the dissertation are included. Finally, it focuses on the mechanisms of viability concerned with strategic levels of management in an organization.

AN OVERVIEW OF VSM

A viable system model is a model of the organizational features of any viable model. According to Beer (1972), a system is viable if it is capable of responding to environmental changes even if those changes could not have been foreseen at the time the system was designed. The VSM is an arrangement of five functional elements that are interconnected through a complex of information and control loops. The emphasis is on recursion that represents, for example, an organization and its departments of which it may also be a functional part. The VSM works on principles of structural recursion, where systems emerge from, and are composed of, a series of sub-systems, each having self-regulating and self-organizing characteristics. The VSM can be used for diagnosing problems of

organizations, hence the term Viable System Diagnosis (VSD), (Beer 1985).

Jackson (1989) reveals that the book "The Brain of the Firm", written by Beer in 1972, the workings of the human body and nervous system, provides the basis for the VSM. From this exemplar Beer (1972) builds up a model consisting of five subsystems of any viable model. In another book entitled "The Heart of Enterprise" Beer (1979) uses the model as derived from cybernetics principles, demonstrating that it can be applied to firms and organizations of all kinds. In his book "Diagnosing the System for organizations" Beer (1985) presents the VSM in a form of a handbook or manager's guide. Clemson (1984) points out that Beer makes full use of all the various concepts and tools devised by cybernetics to understand organizations. In VSM, Beer (1985) encapsulates the cybernetic laws as underpinning system viability and demonstrates their interrelationship.

For a system to become *or* remain viable it has to achieve requisite variety with the complex environment with which it is faced. Beer in Clemson (1984) defines variety as the total number of possible states of a system, or of an element of a system. Variety is also a measure of the complexity of a system, (Leonard 1999). The VSM must be able to respond appropriately to the threats and opportunities presented by the environment. Clemson (1984) clarifies that the VSM, itself is a model and not a methodology, in essence the methodology centres on looking at the organization to discover whether it obeys cybernetic laws or flouts them.

VSM can be used to ensure that new organizational systems are designed according to the cybernetic principles elucidated in the model. VSM is employed as a diagnostic tool where an organization being analyzed can be compared to the VSM check, that its structures and processes are viable and effective. The VSM has been used to both diagnose existing organizational structures and to design new ones (Espejo and Harnden 1989). Syncho and Associates (1992) adds that VSM provides a useful template against which to consider alternative structures and new challenges the system is facing, like integrating its internal and its external knowledge or monitoring the evolution of its identity in a changing environment.

In VSM the organization is made up of five elements or systems that may be labeled as implementation, co-ordination, control, intelligence gathering and policy. It is important that the five functions handled by these five systems be adequately performed in all organizations. These management functions may be repeated at different levels by individual, the work group and on to each successive category as long as it remains relevant. The only criterion is that the system One units, should have management functions support that must produce something of value for the environment such that it could, in its own right, be a viable system. Clemson (1984) stresses that great importance in VSM is also given to the design of the information channels that link the different functions of the system and its environment.

The Viable System Model includes four aspects namely: environment, operations, management and models with arrows representing the interconnections. These aspects are embedded in reality, however in the figure below they are stretched so that interconnections could be observed. Figure 1 shows an operational unit pulled apart to show the major interactions.

Environment *Operations* *Management* *Models*

Fig 1: Viable System Model operational units: Source: *Clemson* (1984).

An organization is viable if it disposes a set of management functions with a specific set of the interrelationships, identified and formalized in the model, according to Espejo & Hamden (1989), Beer (1981), Clemson (1984), Jackson (1989) and Ashby (1960).

Figure 2 below indicates a simplified diagram of the Viable System Model

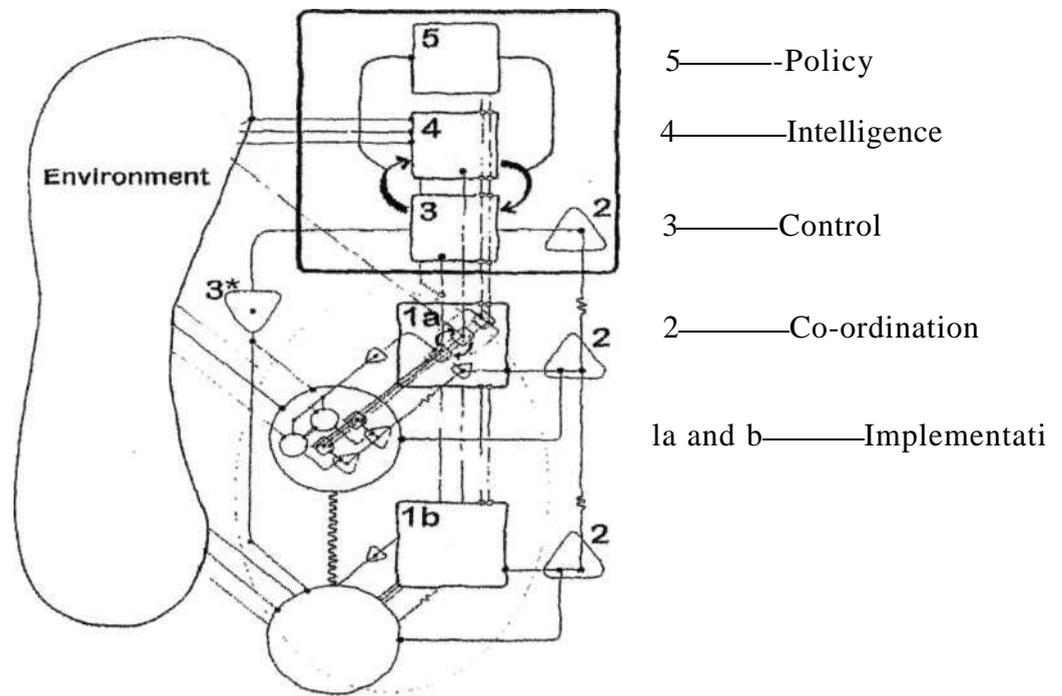


Figure 2: Simplified diagram of the Viable System Model. Source: Beer (1981)

The symbols in Figure 2 have specific meanings. The "cloud" to the left indicates the system's environment. Circles indicate the core operation of the system. Squares and triangles indicate regulatory functions. The thin lines between the symbols indicate the flow of information.

This diagram is a simplified VSM, because it lacks several information loops between the system and its environment and

within the system. Yet, it serves as a starting illustration for description of the VSM. The numbers 1-5 indicate the five essential functions for viability in the VSM, known as implementation, co-ordination, control, intelligence and policy.

Below is VSM detailed diagram that illustrates the five functions reinventing themselves at each recursive level, giving the whole picture a strength and integrity that comes from well interconnected parts.

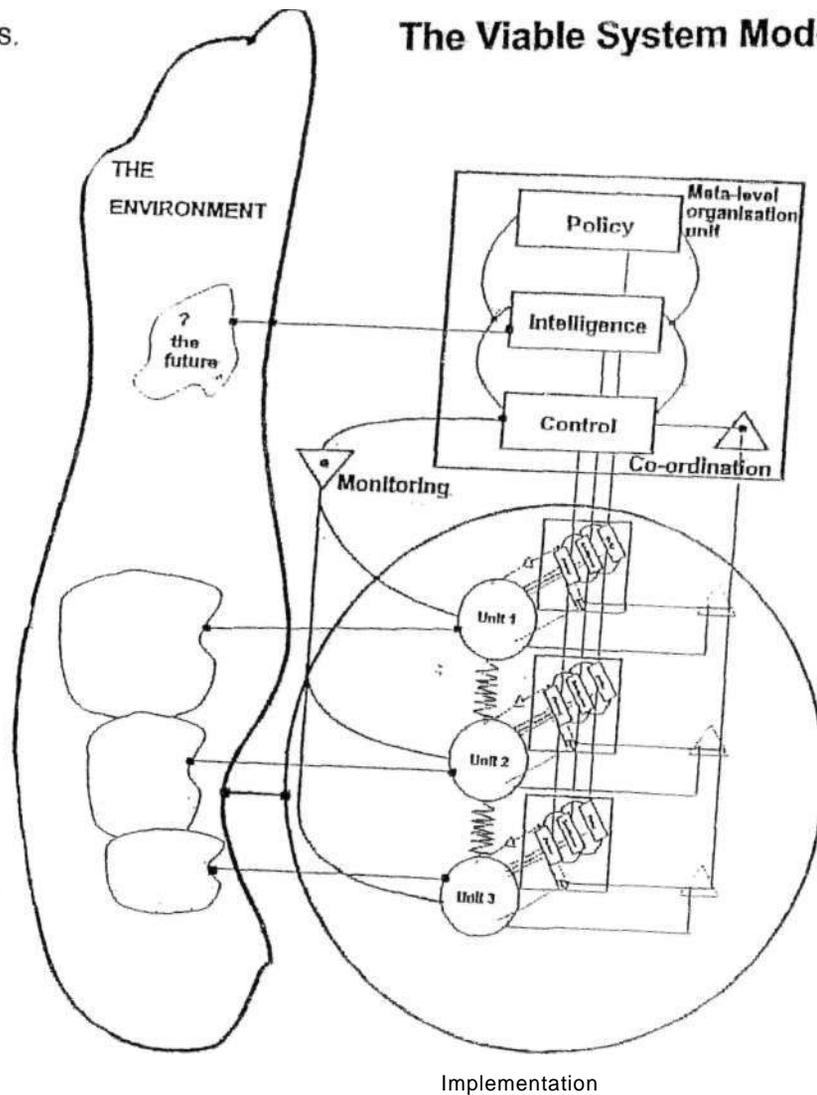


Figure 3: A detailed diagram of Viable System Model Source: *Espejo and Harnden (1989)*

Each line or channel in the model has a communication loop that needs to be designed and managed with the idea of complexity management in mind. Espejo and Harnden (1989) suggest that there should be filtration from the high variety side and amplification from the low variety side in order to manage the complexity differential inherent in most relationships in organizational issues.

2.2.1 THE FIVE KEY SYSTEMS OF A VIABLE SYSTEM MODEL

2.2.1.1 SYSTEM ONE-IMPLEMENTATION

The system one (S1) of the organization consists of the various parts or subsidiaries of it directly concerned with implementation that is, carrying out the tasks that the organization is supposed to be doing. It has the task of regulatory capacity of the basic units. Each part is autonomous in its own right; exhibits all features of a viable system and has its own localized management. Each part connects to its local environment and so absorbs much of the overall environmental variety. The only restrictions on the autonomy of the parts of System one stem from the requirement that they continue to belong to the whole organization. Therefore, their localized management must accept and implement instructions from higher management levels, use negative feedback to maintain performance and report back. Additionally each part of System one must accept a degree of co-ordination and control by systems two

and three, which are designed to facilitate the effective interaction and performance of all the divisions.

SYSTEM TWO -CO-ORDINATION

System two is a co-ordination function that is engaged in the attenuation and amplification to dampen oscillations and activities via information and communication. Under normal circumstances, compatible instructions from higher management should ensure that the various parts of system one of an organisation act in harmony. In an emergence, however, each part of system one will try to act in its own best interests, but based on only local information. The interactions set off among parts of system one might lead to unpredictable and dangerous effects for the whole organisation and for subsidiaries themselves.

Therefore, system two provides co-ordination and consists of the control centres of the parts of system one linked to the organization regulatory centre. It is system two's job to oversee these interactions and to stabilize the situation so as to obtain a balanced response from system one. It sends feedback to the localized management of system one to re-establish harmony, calling, if necessary, the resources of system three.

3 SYSTEM THREE-CONTROL

Before passing to system three, there is an information flow leading to system three known as audit channel. The channel gives system three direct access to the state of affairs in the operational elements. Through this channel, system three gets immediate information rather than relying on information passed to it by localized management of the subsidiaries. System three might be interested in directly checking on quality, employee morale and to see that maintenance procedures are being followed. System three is a vital function in any viable system.

Jackson (1989) reviews duties of system three as, being not to initiate policy but to interpret it in the light of internal data from system two, three and external data from system four. It is responsible for passing a co-ordinated plan down the line to system one. It must oversee the effective implementation of policy and distribute resources to the parts of system one to achieve this. It has to monitor the performance of system one and take control action, in accordance with information it receives up from S2 and S3. In other words, S3 has to do with the investigation and validation of information from system one to three via auditing or monitoring activities.

Beer (1989) gives three kinds of information systems that converge on S3. Firstly, S3 transmits detailed interpretations of policy downward, transmits information from the divisions upward, coalescing it into organization information, thus sending vital information upward quickly. Secondly, it receives and acts upon information from S2. Finally, it responds to information received from S3. The three lower-level Systems, 1 through 3, make up what Beer calls the "autonomic management" of the organization. Espejo and Harnden (1989) emphasize that these three lower levels are capable of optimizing the productive performance of the organization within the established framework and maintaining stability without reference to higher management levels.

However, Syncho and Associates (1992) present that autonomic management does not possess an overall view of the organization's environment. Therefore, S3 is incapable of reviewing organization strategy and reacting to threats and opportunities in that environment, thus S4 and S5 come in.

2.2.1.4 SYSTEM FOUR - INTELLIGENCE

This system has the development function of the organization or the biggest "switch" as Beer (1985) refers to it. System four switches instructions down from the thinking chamber of the organization, that is S5 to the lower-level systems. Then, it switches upward from

systems one to three, information required by S5 to take major strategic decisions. Espejo and Harnden (1989) summarize the major task of S4: it captures for the organization all relevant information about its total environment. S4 is the point in the organization where internal and external information can be brought together. Beer (1985) includes activities like organizational planning, market research, operational research development, and public relations as located in S 4.

Clemson (1984) summarizes duties of S 4 as, intelligence gathering or reporting function that captures all relevant information about a system's total environment. It provides a model of the organization's environment. The S4 distributes environmental information upwards or downwards according to its degree of importance, bringing it to the operations room an environment for decision. In fact, system 4 deals with long and overall outside environment.

SYSTEM FIVE-POLICY

System five is responsible for the direction of the whole organization. It is the thinking part of the organization, formulating policy on the basis of all the information passed to it by system four and communicating the policy downward to system three for implementation by the subsidiaries. Jackson (1989) points out that one of the most difficult tasks in S5 is balancing conflicting internal

and external demands placed on the organization. Beer (1989) recommends that S5 be arranged as an elaborate, interactive assemblage of managers, "multinode". Beer (1985) believes that decision-making needs to be formalised and the effects of decisions monitored without threatening the freedom and flexibility of interaction allowed in the multinode.

The viable system model uses a set of conventions and Clemson (1984) summarizes these conventions as follows:

	environment.
vJ	operational element, an autonomous entity,
LJ	'management unit' within an operational element,
A	models held by a management unit
—j*	Information flow
r>	amplifier
—fff—	filter
S1	system one, the collection of operational elements
S2	system two, the co-ordinating function
S3	system three, the internal and now management function
S4	system four, the external and future management function
S5	system five, the closure and identity management function
JV*	level V of recursion — one level in a hierarchy of autonomous entities, each of which has an S1, S2, S3, S4, and S5.

Fig: 4 VSM conventions. Source: Clemson 1984.

Also important to the model are appropriate information flows and communication links. These communication channels in the model are about how the different parts of the organization and the organization as a whole are performing in relation to their respective goals. Achievement in organization should be measured by adopting the three levels of achievement, that is actuality, capability and potentiality. Beer in Clemson (1989) explains actuality as the current achievement with existing resources and constraints, capability as the possible achievement using existing resources within existing constraints and potentiality as what could be achieved by developing resources and removing constraints.

It is worth highlighting the idea of recursion on which the model depends. Espejo and Schwaninger (1993) stress that a recursive structure comprises autonomous units within the organization. Recursion in an organization enables the same functions to be mapped up and down and compared for appropriate matches of attention, consistency and completeness. People in organization often have roles at more than one level of recursion.

When it occurs, the same question may have different answers depending on the hat one is wearing. When using a VSM, Espejo and Harnden (1989) point out that it is helpful to consider one level of recursion as the "system in focus" and explore the levels of recursion immediately above and below it. The viability, cohesion and self-organization of an

organization depend on the functions being recursively present at all levels of the organization.

2.3.1 THREE BASIC LAWS OF CYBERNETICS

Management cybernetician Stafford Beer spent many years researching the necessary and sufficient conditions for a complex system to be viable, according to Clemson (1989). Beer (1985) determines that viability is maintained by engaging in different activities, keeping them from interfering with each other, managing them together, focusing on the future and doing so in the context of an identity within which interests could be considered. This is how the human nervous system works, and how successful collective organizations work too.

Cybernetics is concerned with systems in which organized complexity and circular causal processes are generally called feedback. Clemson (1984) contends that if organizations are dealing with systems of great complexity and dynamism they may not be able to achieve their practical ends without cybernetics. Therefore, the cybernetics laws are important in dealing with social systems and institutions, as discussed below:

2.3.2 SELF-ORGANISING SYSTEMS LAW

Clemson (1984) states that complex systems organize themselves, the characteristic structural and behavioural patterns in a complex system are primarily a result of the interactions among the system parts. For example

the functioning of a school depends upon a management team, educators, learners, surrounding community and the environment one encounters. Therefore, systems are the way they are because they have organized themselves to be that way. Jackson (1989) adds that complex systems have basins of stability separated by thresholds of instability, this means that some configurations of the systems are stable and others not. The imperative suggested by the laws of self-organizing systems is that the reformers and designers of organizations need to understand which catchment basin they are setting their systems into.

2.3.3 FEEDBACK SYSTEMS LAW

The output of a complex system is dominated by the feedback, and within wide variations the input is irrelevant. All outputs that are important to the system will have associated feedback loops. The law can be stated as any desired result that has no systemic feedback loop will not be achieved or any system that lacks a feedback loop for a desired output is pathologically defective. Feedback loops are one of the major elements that make self-organizing systems work the way they do. The peculiar behaviour of self-organizing systems can be largely explained by invoking sets of interlocking feedback loops. Beer (1985) concludes that these laws pose challenges to managers who could not maintain positions of stability in their organizations.

2.3.4 THE LAW OF REQUISITE VARIETY

Ross Ashby' Law of Requisite Variety is the core of the VSM, Clemson (1984). This law states that a controller has requisite variety, that is, has the capacity to maintain the outcomes of a situation within a target set of desirable states. That means a controller must have the capacity to produce responses to all those disturbances that are likely to take the outcomes out of its target set. Therefore, to maintain a situation under control, the variety of relevant states of the situation must be equaled by the variety of responses that the controller can produce. Syncho (1992) elucidates this law by giving the following example of a man driving a car. The man wants to keep the car on the road. As the road twists and turns the man responds to these disturbances by turning the steering wheel. "The man could be said to have requisite variety since he can apply such measures as are necessary to keep the state of the car within its target set. If, however, the steering broke down and he could not respond to these changes then the car would be out of control and a crash would follow (a state outside the target), this would mean the man did not have requisite variety".

Law of Requisite Variety suggests that the variety of responses displayed by management should at least equal that of relevant states (for Management) in the organization, which in turn should at least equal that of relevant states (for the organization) in its environment. Espejo (1989) interprets the law as the relative complexity of the regulator and the

system to be regulated. In the language of cybernetics, Oldcorn (1996) affirm that issues of knowledge management are regarded as problems of handling variety. Thus, if there is enough regulatory capacity in a control function to manage a situation, that is requisite variety. Another example in understanding this law is that one needs to adopt a certain role for a certain job, but not lose one's identity.

2.3.5 WHY DO SCHOOL ORGANIZATIONS NEED A VSM

The VSM has a long history stretching back over forty years, created by Stafford Beer, it also owes much to earlier work in cybernetics by Warren McCulloch, Ross Ashby, Clemson and Michael Jackson. Over the past ten years, Raul Espejo and Sancho Team and associates have developed viable system model methods. In almost all cases, it is evident that the process has been driven by shared desire to understand why organizations are as they are and how to intervene making organizations work better for people. The VSM is not only logical, it has been corroborated by empirical work, is both systemic and organic, according to Syncho Team (1992).

It is argued that the VSM can provide organizations with the flexibility they need to survive in complex and rapidly changing environments (Leonard 1999). According to Bornman (1992), organizations that apply VSM as an intervention tool enable people to handle autonomously the problems that they confront in their jobs. Therefore, if an organization is to succeed, it

needs to simultaneously develop both the cohesion of the whole, the autonomy of the individual and the groups of which it is composed.

Usually, problems and mismatches in organizations are resolved by firstly communication, and secondly, techniques and technology. The VSM provides a means of moving a set of actors in a problem situation to a common platform of understanding through a common language (Checkland, 1981). The VSM is about relating, structuring the system to facilitate the healthy growth of effective relationships. So, communication means not simply passing data or symbols to others, but relating and sharing meaning.

The VSM addresses the variety implicit in a management situation from two angles: The first is the horizontal relationship depicted as the link between the environment of clients (actors, beneficiaries) with product or service operation (teaching, learning and service) and its direct management. The second is the vertical link that connects the management of the unit with that of the larger organization. In a second angle, the VSM distinguishes among five types of management work (implementation, coordination, control, intelligence and policy) along the vertical lines and the voices associated with each. Then, VSM as a methodology aims at getting the most synergy out of the combined strengths, at preparing for the future, or at finding answers to the questions about the goals and adopting policies to implement in the organization.

The VSM provides a framework for looking at the activities supporting different kinds of knowledge and intellectual capital and where they are used. Wilson (1990) notes that the VSM as an intervention tool helps people to discuss their different models, frameworks and assumptions and to integrate different kinds of knowledge. Syncho Team (1992) suggests that the VSM, have been used in some organizations as a structure for mapping the harmony and the discord of the voices of multiple stakeholders.

MECHANISMS FOR VIABILITY

There are essential characteristics of a viable system such as the ability to make a response to a stimulus that was not included in the list of anticipated stimulus when the system was designed. A viable system can learn from repeated experience what is the optimal response to that stimulus. They are robust against internal breakdown and error. Above all, they continuously adapt to a changing environment. Clemson (1984) summarizes that viable system is characterized by a highly complex structure, complexity of internal connectivity and interaction among parts and complexity of interactions with the environment. There are two principal mechanisms of viability according to Syncho Team (1992), that is mechanism for Adaptation or Policy-making and the mechanism for Monitoring-Control or Policy-Implementation. These mechanisms apply to all viable systems at whatever level of structural recursion.

The principle of recursion demonstrates that all viable systems have their own policy-making properties as well as being accountable for policy implementation, otherwise they would not be able to maintain a separate existence in their environment. For simplicity of understanding, the operation of these mechanisms will concentrate on the strategic level of management in the organization.

2.4.1 THE ADAPTATION OR POLICY-MAKING MECHANISM

The capacity for adaptation of the mission and identity of the organization is normally associated with its strategic levels of management. The questions are: how can policy-makers increase the likelihood that their visions for the organization will support the organization's long-term viability, or what is the appropriate contribution of policy-makers. The concept of Requisite Variety helps us understand that the variety of the policy-makers is by nature lower than that of the organization of which they are members. Therefore, Syncho Team (1992) suggests that policy-makers must have effective attenuators to filter this complexity and bring it within range of their combined capacity. However, there are two other sources of complexity for policy-makers, that is the organization itself and the organization's environment. The organization is concerned with the "inside " and "now" of conditions occurring within the organization. The environment is concerned with the "outside and then" of the actual or possible future environmental opportunities and threats.

The two structural filters concerned with these two main sources of complexity are; control and intelligence in the organization. These functions exist in one form or another in any organization, but they are not necessarily related to well-defined entities on the organization chart. It is possible that one department or an individual, carry out intelligence and control functions, or that in a small organization, all three functions of policy, intelligence and control are combined within one individual. What is important is to structure each of these functions and their interactions in order to make policy-making more effective. Syncho Team (1992) suggests three basic design guidelines as follows: minimize the information requirements of policy-makers, design control and intelligence functions of similar complexity and make intelligence and control highly interconnected.

In minimizing the information requirements of policy-makers, the role of policy-makers should be redefined as that of providing clarity about the overall direction, value and purpose of the organization, rather than the notion that the key role of policy-makers is to make decisions. Their role should be seen as orchestrating at the highest level necessary communications for effective checks and balances between those with the requisite knowledge. Their understanding of technical issues needs to be broad, sufficient to be able to understand and communicate with those responsible for assessing threats and opportunities in the organization environment. In addition, the briefings reaching the attention of policy-

makers need to make minimal demands on their attention, consistent with their capacity to remain in control of the policy processes.

The intelligence and control functions offer alternative, but complementary, perspectives on similar problems related to the definition, adjustment and implementation of the organization's identity. Policy-making is a process, the outcome of which is the choice of courses of action for the organization. The issue of policy making according to Goodman (1997) concerns policy-makers themselves, or elsewhere in the organization. In the former case there is a need to substantiate these issues with further detailed research from a variety of different perspectives. In the latter case, the ideas need to be subjected to detailed analysis and cross-checking from different points of view before they reach the top policy-makers.

Effective policy - making requires the orchestration and monitoring of organizational communication in such a way as to enable people to contribute to the best of their abilities to organizational adaptation and survival. It follows from this point and the concept of structural recursion that the policy-making process happens not just at the top of an organization, but at all structural levels. The extensive communication processes within the organization among different and opposing viewpoints should produce informed conclusions and improve the quality of policy briefings. Policy-makers should be exposed to issues and alternatives that have been properly examined in this way. Thus a lack of

balance between intelligence and control will damage the performance of the policy function; also decisions over-influenced by either of the two filters are likely to be both costly and ineffective.

The effectiveness of the intelligence and control functions depends not only on the capabilities of each function in its own right, but also to the ability of policy-makers to monitor their interactions. Both sets of filters need to be highly interconnected. When this is the case, most of the issues emerging from each side can be crosschecked with reference to the other filter before reaching the attention of the policy function. In the light of the above considerations one may elaborate that the role of policy-makers or leaders at all levels of the organization in a school are as follows:

1. To identify the key issues of organizational concern at a broad, macro level.
2. To bring together into communications the right people with the right mix of skills, that is to form teams and work units containing a balanced representation of the intelligence and control functions.
3. To monitor the interactions of the elements.
4. To consider the alternatives and decide among them in the light of organization's values and short and long-term goals.

Finally, for policy-makers to discharge their responsibility competently, they need a good model of how the organization structure works with reference to a clear vision of the organization's identity.

2.4.2 THE CONTROL MECHANISM

The control mechanism concentrates on three basic guidelines such as to minimise the use of direct command, use sporadic monitoring-with discretion and maximise co-ordination among the primary activities. In order to be an effective filter of the organization's internal complexity, it obviously needs to be in control of the organization's primary activities. The control function's contribution to the policy-making debate is an accurate appreciation of the performance, capabilities and potentials of the organization. As organizations become increasingly complex, sophisticated and often have turbulent environments due to market forces, technology developments or increased competition, so are the primary activities at all structural levels. Therefore, primary activities need greater flexibility to respond to this increased level of change.

Managers need to respond to the control dilemma and avoid losing control of all the primary activities through interacting operationally, providing inputs to another or through environment. Thus, the key role of the control function is to achieve a degree of cohesion among these parts of the organization for which it is held accountable. One way of reducing the use of direct commands is by designing good exception reporting systems, a process which computing technology is increasingly able to support. Management By Objectives (MBO) also plays its part in helping the senior management to see "the wood from the trees" and avoid much

interference. MBO emphasizes a participative approach with joint determination of objectives and evaluation of success periodically.

Espejo and Harnden (1989) maintain that the two explained guidelines that is (minimise the use of direct-commands and maximise co-ordination among primary activities) are devices not sufficient to deal with the control dilemma and they do little to address the problem of maintaining cohesion and synergy among the operating units. But they recommend the use of sporadic monitoring with discretion as the one that can address these issues. Using the information provided by the divisional management this could reflect their experiences and viewpoints. Corporate management needs to crosscheck this information with an alternative source to understand its meaning for divisional managers. This is achieved by developing a monitoring channel that runs directly between the senior level management and the primary activities themselves, then bypassing the divisional management.

The control function needs an assurance that they can align their understanding of accountability, and other, divisional reports, with the originator's understanding of these reports, including organization's interests. However, Syncho and Associates (1992) states that organization management must adhere to the following principles:

- (1) monitoring should be sporadic, rather than regular, anticipated events, otherwise they are going to be ineffective in getting candid views about what is really happening within primary activities.

- (2) monitoring must be infrequent, otherwise they risk undermining the authority and trust vested in the management of the primary activities.

Mechanisms of viability can not prosper without the principle of synergy that is a set of working together so that the combination of the separate parts is more effective than if each acted alone. With synergy the whole is greater than the sum of its parts. Synergy is expected to occur whenever system elements or systems themselves interact. The effects of synergy may impel the system along the intended direction or they may cause it to move in another direction altogether. Both its unpredictability and its amplification may lead to results requiring additional planning or action and problems or opportunities of greater magnitude.

Finally, in any viable system there is, in one form or another, a complimentary between monitoring-control and autonomy. The challenge is to find criteria of effectiveness to make use of this complimentary in improving the design of the school as an organization.

2.5 A SUMMARY OF USEFUL MODELS IN THE DISSERTATION

The useful models used in the dissertation include the Business Idea of the school, the Systematic Management-Change Intervention, Toulmin Argument model for maintaining COLTS and the Flux approaches model. The models will facilitate understanding of the process of using a VSM in the COLTS context.

2.5.1 THE BUSINESS IDEA MODEL OF THE ORGANIZATION

The business idea is the rational explanation of why the organization has to succeed or will be successful in the future. The business idea is an organization's mental model of the forces behind its current and future success, Drucker (1994). According to Senge (1992) mental models are the images, assumptions and stories which we carry in our minds about people, institutions and every aspect of the world, and these mental maps are flawed in some way.

Mental models are existing below the level of our awareness, thus regarded as tacit. It is through the business idea that mental models can be tested, examined, brought to the surface and eventually they shape how we act in our organization. For example, in a school situation, among educators, there is a widespread tacit assumption that parents do not really know much about what their children need. Therefore, an articulated business idea needs to be studied, discussed, modified and improved by all parties participating in the organization.

PERSONAL MODEL FOR SYSTEMATIC MANAGEMENT AND COLTS MAINTENANCE

The personal living model for systematic management is a self-reflective process of how one can deal with COLTS issue in an organization with the help of understanding VSM. This model can guide the organization to analyze the situation and develop its own understanding in terms of:

context in school, problem statement/organizational issue, theory, interventions, practice, change Intervention and restoration of COLTS results in Whole School Development.

2.5.3 The Toulmin Argument Model

The Toulmin's argument is a set of propositions connected and identified by operators making the argument logic and can be screened for consistency. The advantage of this model is that it allows strategic planners to be flexible about different information aspects of the decision situation. The Toulmin's argument model illustrates the relationships among the COLTS elements and how to assess these elements to support an organizational issue by presenting guidelines for organizational action. Since most management decisions are based on some sort of information, the information should be supported by Toulmin's six components such as claims, evidence, warrants, backing, qualifiers and rebuttals. Paul (1993) elaborates on the six Toulmin components as the following:

- > Claims: are disputable statements that are the focus of the argument and represent the core of the organizational issue.
- > Evidence refers to information and data offered as evidence to support the claim.
- > Warrants: authoritative attributions, common knowledge or reasoning and inferences connect the evidence to the claim. This linkage is called the warrant.

- > Backing: are additional supporting statements that buttress the warrant and strengthen its credibility.
- > Qualifiers: are hedging statements that indicate limits to the claims and thereby enhance its validity.
- > Rebuttals: are conditional statements that further limit the scope of the argument by pointing out exceptional cases.

Therefore, the statements of reasoning which support the argument should be clear, relevant data, consistent and valid. The model of argument proposed by Toulmin, hence known as Toulmin argument model.

2.5.4 FLUX (CHANGE) APPROACHES MODEL

People involved in a school are encouraged to understand the flux in different approaches such as:

1. autopoietic manifestation of our own actions.
2. networks of mutual causality shaped by processes of positive and negative feedback.
3. dialectical process of unfolding contradiction.

The autopoietic viewpoint suggests firstly that one can best manage change and problems by being aware of the self-referential processes through which we organize and produce our environments. Secondly one maybe able to change the nature of change by replacing egocentric images with ones that recognize our interdependence with others. The mutual causality perspective develops a related viewpoint that

encourages us to give particular attention to the nature of relations and interconnections. As a dialectical process it manages and reshapes those relations that shape our organization and to manage change by reframing those oppositions. These strategies have complimentary features and are integrated to provide an extremely powerful means of influencing the logic through which the school organization produce and reproduce.

CONCLUSION

The literature review has shown the relevance and sufficient linkages of the literature to the statement of the problem. One can conclude that an overview of VSM, basic laws of cybernetics, principle of requisite variety, viability mechanisms, discussion on why do school as organizations need a VSM and useful models renders VSM as an important intervention tool to be applied in COLTS context in school.

The next chapter looks at an organizational issue of COLTS and the process of using VSM as a diagnostic tool to check organizational viability.

CHAPTER THREE

THE PROCESS OF USING A VIABLE SYSTEM MODEL IN THE CONTEXT OF ESTABLISHING, MAINTAINING AND RESTORING A CULTURE OF LEARNING, TEACHING AND SERVICE IN A SCHOOL: AN ORGANISATIONAL SETTING.

3.1 INTRODUCTION

This chapter identifies and discusses COLTS as an organizational issue and how I perceive my role in the organization in the light of understanding VSM. The business idea of my organization is given as a starting point for the application of VSM. A viable system model of COLTS follows from system one to five being guided by system identification and system diagnosis. Finally, the constraints imposed upon each part of system one by management and the discord /common faults found in the organization are exposed.

3.2 IDENTIFICATION OF AN ORGANIZATIONAL ISSUE - COLTS

The organizational issue is that of establishing and restoring a culture of learning, teaching and service in a school. The management team and educators have to look at the professional life of the school, that is, day to day administration and organization of learning and teaching activities at the school. Various role players including school managers need to focus their vision and goals on promoting quality service of learning and teaching being guided by Provincial and National policies. When, offering

this service, the school has to undergo transformation in a number of approaches that form part and parcel of COLTS context, to mention a few: school policies, code of conduct, new curricular, continuous assessment, and whole school development. This way of working requires a new way of thinking, action, research and learning.

There is a challenge of a coherent strategy to restore COLTS in schools. The tendency is to lay blame on educators in isolation from the role-players or stakeholders. But, for COLTS to succeed problems must be dealt with by all parties including Departmental officials, educators, school managers, students, business or private sectors, Non Government Organizations (NGO's), Community Based Organizations (CBO's) and local communities. Senge (1992) maintains that the ultimate glue that binds people is not what they get from the organization but what they contribute to the community.

The strategic objective of COLTS programmes is to foster an institution ethos conducive to learning, teaching and service aiming at enhancing the learner outcomes. The restoration and enhancement of this culture has been explicit objectives of the Education Ministry since 1994, thus all the work in schools is directly or indirectly devoted to this task.

The gathering of role-players in a school is also a key to successful COLTS. Denton (1998) elaborates on the concept of stakeholder, that stakeholders can be those persons who have a vested interest in some

common item in any of the three ways: by mainly affecting it, affected by it or by both affecting it and being affected by it. The role-players in a school are identified as educators, learners, teacher unions, school management team, school governing bodies (SGB's), parents, public and private sectors, NGO's, CBO's and National, Provincial, Regional, District and Circuit Officials. The diagram below indicates role-players in school.

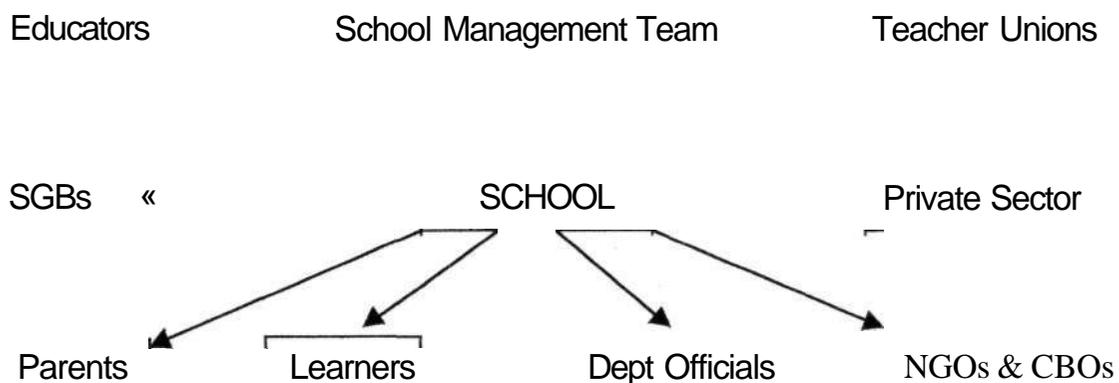


Fig 5: Stakeholders or Role players in school.

The key stakeholders should be those people who make things happen and have a degree of influence in the school. Above all, stakeholders determine what it takes the school to remain competitive (performing well), and if not, what to do about it. An organizational audit is necessary to be conducted by stakeholders to reveal distinctive competencies. A school that is performing well will attract sponsors and maintain its viability. This diagnosis according to Drucker (1994) includes guidelines such as:

1. What is the core business/function, core competencies and skills required in the organization?

2. Which of these competencies are available and which are not?
3. Which functional units of the organization are most crucial to the business to determine whether they will continue to be as important in the future?
4. What are the key systems that drive the organization?
5. What are the shared values and idiosyncrasies that comprise the organization's being?

If these questions are explored in depth, one realizes that they can generate responses that give direction in an organization. Therefore, role-players in Education are influential agents and depending upon their work, they can either advance or retard the process of COLTS enhancement. Senge (1992) adds that for an organization to excel, it has to work as a team, there must be an intrinsic synergy of its basic elements, where the whole is greater than the sum of its component parts.

3.3 HOW I PERCEIVE MY ROLE IN THE ORGANIZATION IN THE LIGHT OF UNDERSTANDING VSM.

My organization is an educational institution, which is known as Mgitshwa High School. The school has a challenge to improve, develop its organizational activities and become a self-reliant-learning organization. For a school to achieve this, its main purpose of existence, that is offering learning, teaching and service should be restored and maintained.

One's role within COLTS context is multifaceted, in a sense that one is, for example, an educator, an administrator, head of the school, a school manager, a class educator or manager, a liaison, monitor, a disseminator, a spokesperson, a problem - solver or disturbance handler, resource allocator and negotiator. One can summarize one's role with a table below that indicates three main types of roles, which are divided into twelve roles.

INTERPERSONAL ROLES, INFORMATIONAL ROLES, DECISIONAL ROLES

Educator	Monitor	Problem-solver
Administrator	Disseminator	Resource Allocator
School Manager	Spokesperson	Negotiator
Class Manager		
Head of the School		
Liaison		

Fig 6 Three main types of one's roles.

Understanding the above roles, one can see that one is involved in a number of tasks, for example, to mention a few:

1. One is involved in the assessment of learners through planning, formative and summative assessment which should be, in compliance with the Departmental Norms of Pass or Fail (standards/ requirements set by the education department).
2. One has to facilitate learning through direct teaching and preparing material.
3. One is expected to analyze school needs finding out the learning needs of the defined school (curricular needs).
4. One is also a learner supporter where guidance and counseling, monitoring and referrals are part of one's role.

In the light of understanding VSM, the role I play is highlighted by the various activities I am engaged in within the five functional systems of the organization:

Firstly, I am directly involved in implementation which is the first functional system, that is carrying out learning, teaching and service task that the organization is supposed to be doing. In implementing this task, there are operations such as new curriculum, code of conduct of learners, new approaches to teaching, staff development, continuous assessment, restoring COLTS and the process of whole school development.

Secondly, one is involved in the second functional system referred to as co-ordination. I manage the various parts of system one to ensure that they act in harmony within the organization. One is also assessing information received from localized management of the subsidiaries (HOD's, Subject Heads, School Management Team and Representative Council of Learners to the best interests of the organization. One is involved in controlling the centres of the parts of system one in order to prevent dangerous oscillations arising in the system created by all the subsidiaries. Without the co-ordination, interactions between these parts can create violent oscillations that can have a negative effect and destabilize the whole organization.

Thirdly, I am involved in the policy interpretation using the data from internal and external environments. One is directly involved in maintaining

the quality of services offered in the organization. One has to take part in the effective implementation of policy and distribution of resources to the parts of system one. The monitoring of the organization's performance and auditing is part of my activities in system three that is control function. The maintaining of internal stability without reference to higher management levels is part of my role.

The intelligence gathering or reporting function is regarded as system four in the organization. Fourthly, my activities include capturing all relevant information about the system's total environment, distributing environmental information upwards or downwards according to its degree of importance. Above that, one provides a model of the organization's environment in system four. Activities in this level also include corporate planning, reviewing school policies, allocation of staff duties, school development programmes and public relations are located in system four and it becomes the "operations room" of the organization.

Fifthly, one is responsible for the direction of the whole organization. Beer (1985) refers to this function as system 5 responsible for policy. My activities include being the thinking part of the organization, formulating policy on the basis of all the information passed to it by system 4 and communicating the policy downward to system 3 for implementation by the subsidiaries. One has to make a balance between conflicting internal and external demands placed on the organization. One is involved in decision

making and the effects of decisions are monitored without threatening the freedom and flexibility of interaction allowed in the multinode.

THE BUSINESS IDEA MODEL OF MGITSHWA

One has been instrumental in the formulation process of the business idea of the school. An articulated business idea needs to be studied, discussed, modified and improved by all parties participating in the organization.

The business idea is the rational explanation of why the organization has to succeed or will be successful in the future. The business idea is an organization's mental model of the forces behind its current and future success, Drucker (1994). According to Senge (1992) mental models are the images, assumptions and stories which we carry in our minds about people, institutions and every aspect of the world, and these mental maps are flawed in some way.

The Business Idea of Mgitshwa High school.

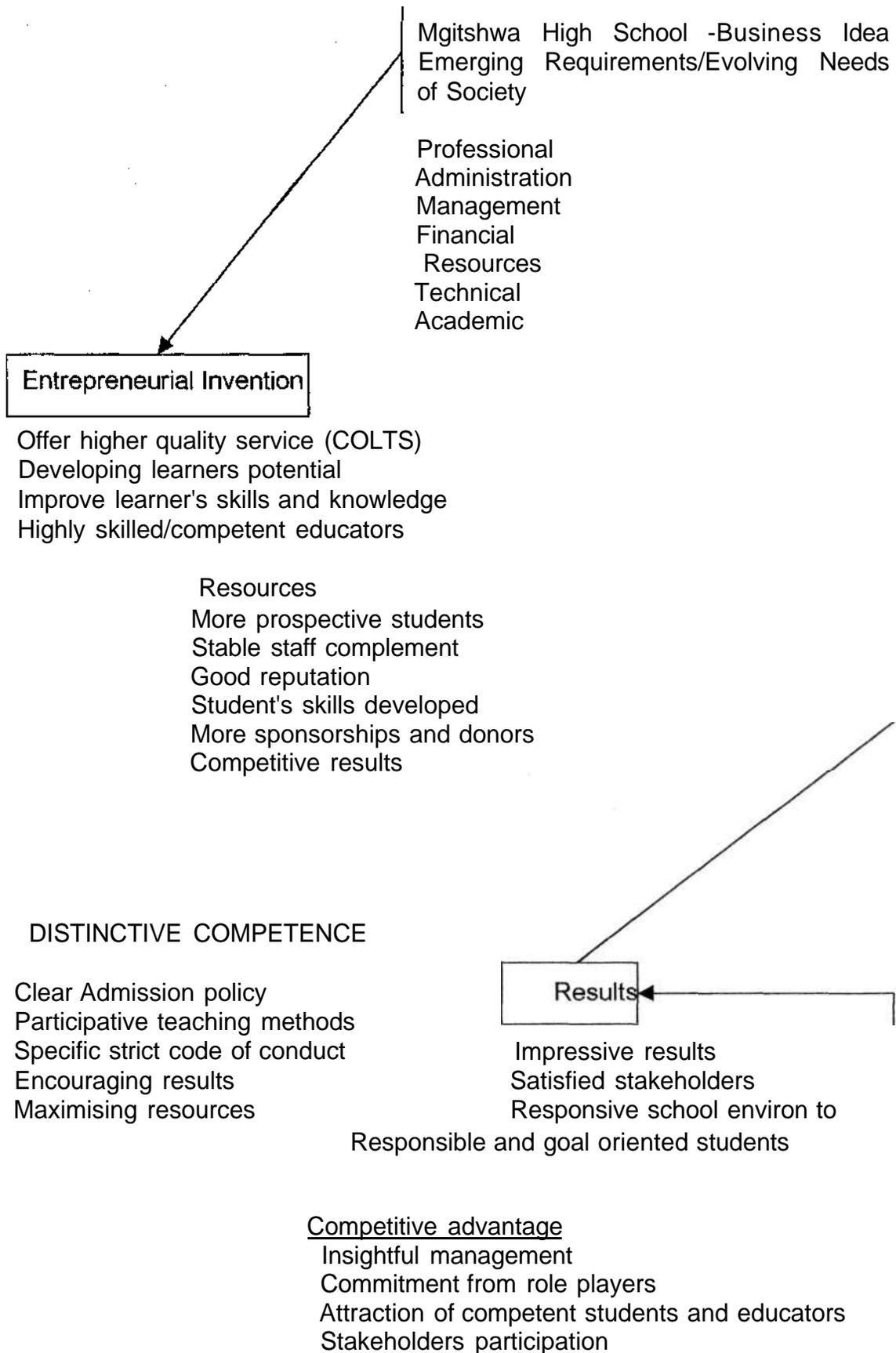


Fig 7 Business Idea of Mgitshwa High

3.5 THE PROCESS OF USING VSM IN AN ORGANIZATIONAL ISSUE (COLTS)

The context of COLTS has input, transformational activities and output. The input represents learners with low skills; transformational activities include learning and teaching programmes, continuous assessment, school policies and whole school development. The output represents learners with high skills. The diagram below indicates input, transformation activities and output in COLTS context.

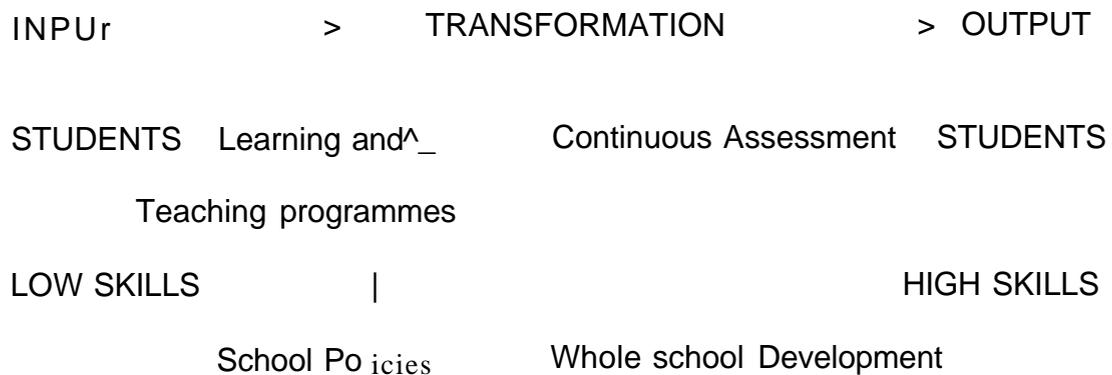


Fig 8: COLTS input, transformation structure and output.

3.5.1 COLTS VIABLE SYSTEM MODEL

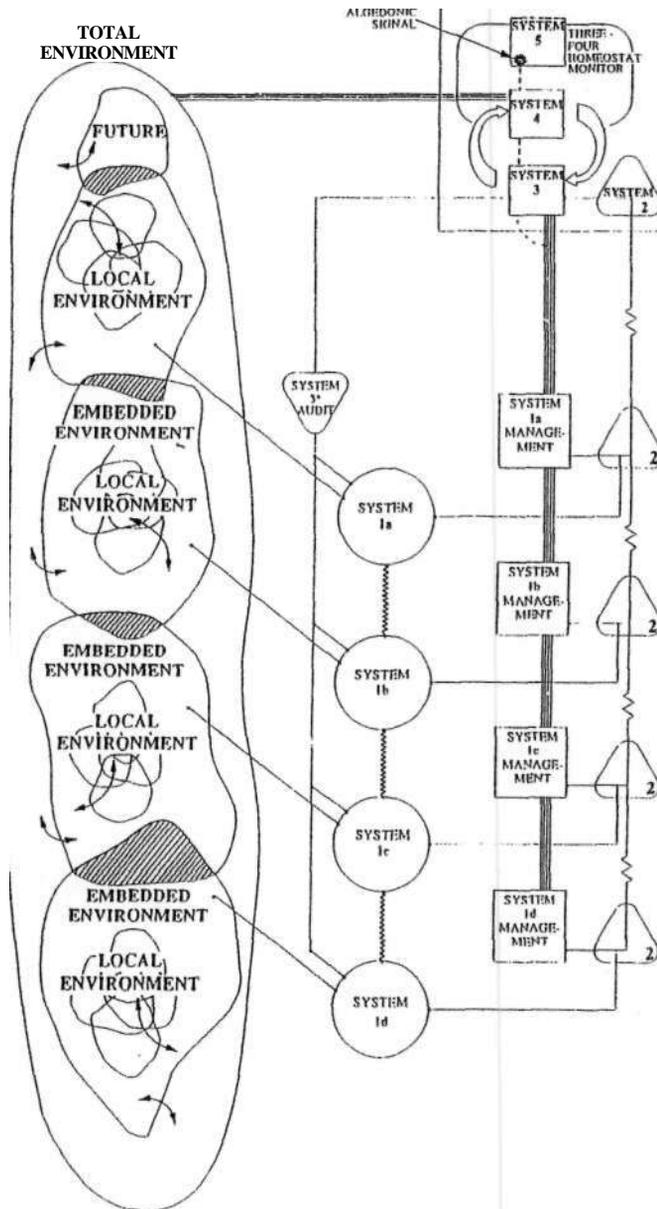


Fig 9 COLTS Viable System Model.

The COLTS viable system model consist of the following components:

- S1A = Learning Teaching Programmes
- S1B = Continuous Assessment
- S1C= School Policies
- S1D = Whole School Development
- 52 = Management Team and Educators
- 53 = School Governing Body and Management Team
- 54 = Stakeholders, School Governing Body and Management Team
- 55 = School Governing Body and Management Team

3.5.2 **SYSTEM 1(A) LEARNING AND TEACHING PROGRAMMES**

Environment

Internal

School
 Available resources
 Commitment
 Attitudes
 Infrastructure
 Colts

External

Dept.of Education
 Political
 Societal
 Economic
 Technological

Operations

Teaching and learning
 Extra-mural activities
 Allocation of staff duties
 Time-tables scheduling
 Monitoring and supervision
 Honouring teaching time

Localised Management

Principal, Subject teacher, Deputy principal,
 Class teacher, Hod's and Subject Heads
 Sports committee, Prefects, Deputy
 Principal
 School management team (SMT)
 Time table committee and SMT
 SMT
 Subject teachers, SMT

System 1(B) Continuous Assessment

Environment

Internal

School
Resources and equipment
Commitment
Attitudes
Infrastructure

External

Department Norms of Pass and Fail
Political
Economic
Societal
Technological & economic

OPERATIONS

Participative teaching methods
Educators skills and preparations
Identification, development of learners potentials
Enhancement of learners skills Sknowledge
Monitoring school work
Setting of tests, exams

LOCALISED MANAGEMENT

Educators and SMT
Learners
Class managers
Subject teachers
SMT
Subject teachers

SystemI (C) School policies

Environment Internal

School
Resources
Commitment
Attitudes
Infrastructure

External

Cultural
Economic
Societal
Technology
Dept. of Education

OPERATIONS

Drawing school governing body constitution
Formulate school's mission statement
Drawing of admission, language &
religious policy.

LOCALISED MANAGEMENT

Learners, educators and parents
SGB, management team
SGB, role-players/stakeholders

System 1(D) Whole school development

Environment Internal

School
Available resources
Commitment
Attitudes
Infrastructure

External

Dept.of Education
cultural
economic
technological
societal

OPERATIONS

Leadership in school
Human relations in school
Managing communication
Financial and administration

Staff development programmes
Educator appraisal system

LOCALISED MANAGEMENT

SMT.SGB, learners,
Educators,
supporting staff,
management team, SGB and
stakeholders

3.6 WHAT CONSTRAINTS ARE IMPOSED UPON EACH PART OF SYSTEM ONE BY MANAGEMENT .

In learning and teaching it is possible that time frames for performing duties such as setting of tests, submission of mark lists and issuing of results is in conflict with the educators and learner's pace of learning and mastering school work. For example, class managers and subject teachers with big classes are not given extra time and they also delay submission, making an excuse of large numbers. Sometimes, educators do not easily welcome being allocated to classes different from those they were teaching the previous year, neglecting personal growth and development in all classes. Therefore, time frames and allocation of duties by management can result in a number of constraints. The school

management team sometimes fails to provide necessary resources that can improve learning and teaching activities.

In continuous assessment, the higher management is interested in good results but sometimes fail to provide the necessary teaching and learning resources and the pace of educators and learners is not considered. The large classes give educators a difficult task in ensuring that continuous assessment is monitored effectively. This hinders the development of learner's potentials and skills.

With school policies, the management is sometimes not open, free and flexible in welcoming educator's contributions towards the formulation of school policies. The management ignores the admission policy when the enrolment is far below the expected total. This at the end poses many problems for educators who deal with incompetent learners in the classrooms. There is contradiction and misinterpretation between School policy and School's Act of 1996 in some issues, for example non-payment of fees by learners, uniform and dealing with serious offences by learners. Educators, sometimes view school management team as being lenient in administering punishment that goes with an offence.

The whole school development has many challenges for everyone in the school but sometimes the introduction of such challenges and opportunities is not well managed and it results in a waste of time and resources. Educators feel that not enough follow-ups are done on certain

agreed issues, for example mechanisms for curbing teacher's absenteeism.

3.7 ACCOUNTABILITY

Learners account to their class representatives and prefects to the class managers. Educators account to their Subject Heads, Head of Department (HOD), HOD's to the Deputy principal and Deputy principal to the Principal. The school principal accounts to learners, school management team, educators, SGB, parents, District officials and various school stakeholders. Principal account to the Department of Education officials and to the entire school community. It is important to point out that sometimes this line of accountability is not followed depending on the issue at present. Heads of department do monitoring on educators work including scheme of work, daily preparation, punctuality, honouring of teaching time and proper follow up of subject policies. The class teachers monitor student's progress, assessment and maintain high quality of schoolwork.

3.8 SYSTEM TWO

Components

The components of system two include the Management team and educators.

Sources of conflict

1. Non-payment of school fees

2. Undisciplined learners
3. Learners absenteeism and absconding
4. Educator absenteeism and late coming
5. Poor infrastructure e.g. sanitation, water and electricity.
6. Vandalism of facilities, buildings and equipment
7. Unavailability of resources
8. Political, economic, social, cultural and technological conditions.
9. Guidelines in School's Act are sometimes misinterpreted.

3.8.1 ELEMENTS WITH A HARMONISING EFFECT

The educators reduce absenteeism through monitoring class registers and period registers. Educators keep a record of learners who abscond on daily basis and follow the disciplinary measures documented in the learner's code of conduct. The management team encourages everybody to utilize resources available and improvise the limited resources. Both educators and management team monitor the school equipment and follow the proper channels of disciplining learners. The management team also take necessary steps in disciplining educators. System two is semi democratic in the sense that it cannot operate on its own without the interference of system three.

3.9 SYSTEM THREE

Components

The components of system three include the following, Heads of department, deputy principal, principal and school governing body (SGB).

The components of system three run the daily activities within the school, they are in control of all activities taking place in school. The management team interprets data from internal and external environments. They are in charge of distributing resources to the subject heads, heads of departments and educators. The monitoring of teaching time and checking of educator's work is part of system three components. System three audits class mark lists, class schedules and whether the requirements of pass or fail have been correctly applied. The management team also makes sure that the school policies and constitution are adhered to and the environment within the school is conducive to learning and teaching. The relationship between system 3 and 1 is perceived as both autocratic and democratic (controlled and uncontrolled). System one is semi democratic in the sense that it cannot operate on its own without the interference of system three.

3.10 SYSTEM FOUR

Components

The components of system four include a management team, school governing body and stakeholders (parents, private sector, department officials, NGO's and CBO's). The management team is engaged in school

governance development, using the guidelines of the School's Act of 1996. The SGB functions co-operatively with management team in promoting whole school development. The stakeholders provide resources, especially the financial ones. It is the duty of SGB to monitor school funds .The stakeholders also monitor their donated funds whether they are utilised for specified purposes and in a proper manner. The management team and SGB network with industries such as Mondi Kraft, Alusaf, Richards Bay Coal Terminal and Richards Bay Minerals for donations. In system four it is where planning and decisions are taken pertaining to activities of the whole school and the external environment.

Therefore, the interpersonal contacts inside and outside the school gives the components of S4 access to information. The processing of information becomes the key part SGB's, SMT's and Role-players. This process is used to get information and monitor it from formal and informal sources, such as Department of Education and the Community. Usually, there is regular and systematic way of disseminating information on daily, weekly and monthly basis.

3.11 SYSTEM FIVE

Components

The school governing body and the management team are components of system 5. The management team and SGB are conscious of the School's Act of 1996, but they set their own policies, constitution and code of conduct. The functions of the SGB in terms of School's Act are clarified.

The management team is sometimes class teachers and subject teachers in that way they share the identity with system 1. The SGB's and SMT's have good ideas, innovations for new developments and projects but they are failing to strike a balance between activities that are most important, most urgent and important, but not urgent.

3.12 THE COMMON FAULTS OR DISCORD FOUND IN THE SCHOOL ARE PRESENTED BELOW:

The learners are still passively involved in learning and development of their skills is limited. There is a concern from educators that parents are not doing enough and are neglecting also their responsibility. The culture of learning, teaching and service is not yet fully entrenched in the school system. This is evidenced by late coming, absenteeism by both teachers and learners. Though the educators and learners are supposed to have an equal say in the affairs of the school, it is not the case. The local managers of system one resent interference from system two, therefore system two is not fully established. The school is still partly bureaucratic which lessens innovation and learning. System one processes are incomplete to meet the requirements of the business idea. The organization is still battling to attend the environmental and transformation changes. The management team is still excessively involved in day to day affairs and not directing time and energy to initiate changes.

The overcrowding in classes results in anti-personal, unfriendly relationships between educators and learners. Some basic resources and facilities are not attended to with promptness, for example, absence of proper laboratory and sanitation facilities. Some clauses in the school policy are not compatible with those in the School's Act, for example the pregnancy issue among learners.

3.13 CONCLUSION

The application of VSM in COLTS context, makes the principle of synergy very clear and helps school to assess whether the whole is greater than the sum of its parts. The COLTS diagnosis provides a language for discussing viability and facilitating maintenance of continuous balance between autonomy of the parts and the whole school. The constraints experienced by each system and discord present in COLTS activities can help role-players to reengineer the school activities.

CHAPTER 4

USEFULNESS OF VSM AS AN INTERVENTION TOOL (METHODOLOGY) IN AN ORGANIZATIONAL ISSUE OF COLTS IN EDUCATIONAL INSTITUTION -SCHOOL.

4.1 INTRODUCTION

This chapter explores the usefulness of VSM theory in the context of COLTS in a school organization. The discussion centres on understanding the link between theory and practice. The usefulness of VSM theory is that it presents ideas about how the school community can promote organizational efficiency, viability and constantly monitored activities. It is also a diagnostic tool to make specific recommendations for improving the performance of the organization. The COLTS context presents a school as an organization characterized by changing circumstances and need for innovations. Checkland (1981) stresses that relations between organization and environment as open systems should be understood.

The school is a complex system where mutual causality should enable people to enhance their abilities to organize and to solve organizational problems by understanding the marriage between theory and practice. It is through theory and practice that the school community sees how situations and problems can be framed and reframed in different ways allowing new kinds of situations to emerge. The usefulness of VSM as an

intervention tool in COLTS context benefits people by developing the style of organized analysis that enables school community to deal with the complex nature of school organizational life in a very realistic way. The discussion of VSM relevance in a school shows how people can open their thought processes so that they could read the same situation from multiple perspectives in a critical and informed way.

4.2 USEFULNESS OF VSM IN COLTS CONTEXT IN SCHOOL - ORGANIZATION

VSM is a useful model that is capable of dealing with school- organization whose parts or departments are both vertically and horizontally interdependent. The idea of recursion enables the VSM to cope with vertical interdependence displayed in, for example, Education System, which embraces departments. Jackson (1989) claims that the applicability of the VSM at different system levels acts as a great variety reducer for managers and can be incorporated into a usable management tool only in the VSM.

The horizontally interdependent subsystems, the parts of system one, are integrated and guided by the organizational meta-system, that is system two to five. Zammuto (1982) contends that the hoary old problem of centralization versus decentralization is dealt with in the VSM by arrangements to allow overall systemic cohesiveness.

In VSM the source of control is spread throughout the architecture of the system. This allows the self-organizing tendencies present in all complex systems to be employed productively. From the process of using VSM in COLTS context, one realizes that VSM demands that attention be paid to the sources of command and control in the system. The relative autonomy granted to the parts within the VSM should be noted. Problems are corrected as closely as possible to the point where they occur. The importance of encouraging self-organization and freeing management for boundary-management activities is well noted. Yet, some restrictions on autonomy are of course essential, and these are imposed by system two and three so to ensure overall systemic cohesiveness.

The VSM theory offers a suitable starting point for the design of information systems in organizations. The information processing takes place first and recommendations for organizational design follow on the basis of information requirements, as revealed by the law of requisite variety in VSM. The organization is represented as being in close interrelationship with its environment, both influencing it and being influenced by it. The organization does not react to its environment but can proactively attempt to change the environment in ways that will benefit the organization.

A system of concern can be compared to the model to check that its structures and processes support an underlying organization capable of ensuring survival and effectiveness. Clemson (1984) maintains that the

VSM is concerned with what defines a system and enables it to maintain its identity, rather than with the variable relations that can develop between components integrating particular systems. As a result VSM is applicable to small and large institutions, firms, training programmes, local and national government.

Espejo and Harnden (1989) observe that VSM makes substantial contribution to the type of knowledge related to the technical interest that supports strategic action oriented to regulation in the social domain. The applicability of VSM in COLTS context delivers a massive increase in the steering capacities of organizations. Clemson (1984) views the VSM as a sophisticated systems model of great generality, pinpointing various systemic or structural constraints that must be observed if an organization is to succeed as an adaptive and goal-seeking entity. The VSM is geared to tackling problems of differentiation and integration. It further provides insight into the proper arrangement of command-and control systems. Additionally, VSM fosters clarity into the design of appropriate management-information and decision-support system. VSM treats urgently organization-environment relations and yield specific recommendations for improving the performance of organizations.

VSM theory highlights that for an organization to remain viable it ought to have a constantly monitored process that is adjusted to its changing environment. Moreover, it has a criterion of good management that establishes requisite variety between itself and the operations managed,

and between the organization as a whole and its environment. This results into better insights about the organization, which should be an ongoing process of learning. Espejo and Harden (1989) reveal that the VSM has many features that promote decentralization and autonomy. This offers the powerful means for increasing control and flexibility. However, the granting of the maximum autonomy to the parts can be interpreted, as a management control technique.

VSM is seen as an organizational model that aids to orientate ongoing conversations about complex social issues. The VSM expresses coherent and usable cybernetic principles of effective organization. If an organization does not respect the law of requisite variety, for example, it will not work well compared to the one that does, and its viability will be threatened. Therefore conversations in the organization should have lessons of the law of requisite variety. The VSM theory indicates that learning can be enhanced systemically leading to self-development and inquiry. Thus VSM theory can reflect on the cycle of Kolb's experiential learning including concrete experience, observation, reflections, ideas, generalizations and testing of ideas.

VSM theory offers opportunities for COLTS in school to realize and cherish the ideas of Ringland (1998) and Van der Heijden (1996): that the school is expected to challenge itself in developing the creation of a new context, the 'doing' and 'being' investing a powerful future, manage the present from the future, devise an organizational audit, assemble its key

stakeholders, create urgency, and discuss the undiscussable. The VSM displays an interpretative methodology based on learning. It is employed to reveal the cybernetics of the situation, and diagnosing communication problems leading to a discovery of the causes of operational problems, thus making it possible to improve the situation.

Metaphorically, the VSM theory successfully combines the strengths implicitly in viewing school organization as machines with what is to be gained by conceiving them as organisms and brains. The arrangements at the operational level (system 1 through 3) ensure the optimum use of resources in carrying out transformation processes, while system 4 and 5 ensure adaptation to the environment and the institutionalization of learning. System 5 is charged with maintaining a balance between the inside and now and the outside and then. This means that the management team and the school governing body should deal with internal matters that are urgent and plan for the future being guided by the external milieu.

VSM theory exposes the design of goal-seeking and adaptive system, which means that, if COLTS context is designed according to cybernetic principles it will be self-regulating and even self-organizing in the face of environmental perturbations. The tools provided by organizational cybernetics give the problem solver the best chance of dealing with difficulties in COLTS problem context.

VSM theory is concerned with how well the organization is doing in terms of preparing for the future by adopting three levels of achievement, that is actuality, capability and potentiality. Ringland (1998) defines the three levels as actuality as is the current achievement with existing resources and constraints. He defines capability as the possible achievement using existing resources within existing constraints, and potentiality as what could be achieved by developing resources and removing constraints. These levels can be combined to give three indices, that is productivity, latency and performance. The school develops its own performance indicators in terms of goals, qualitative and quantitative indicators.

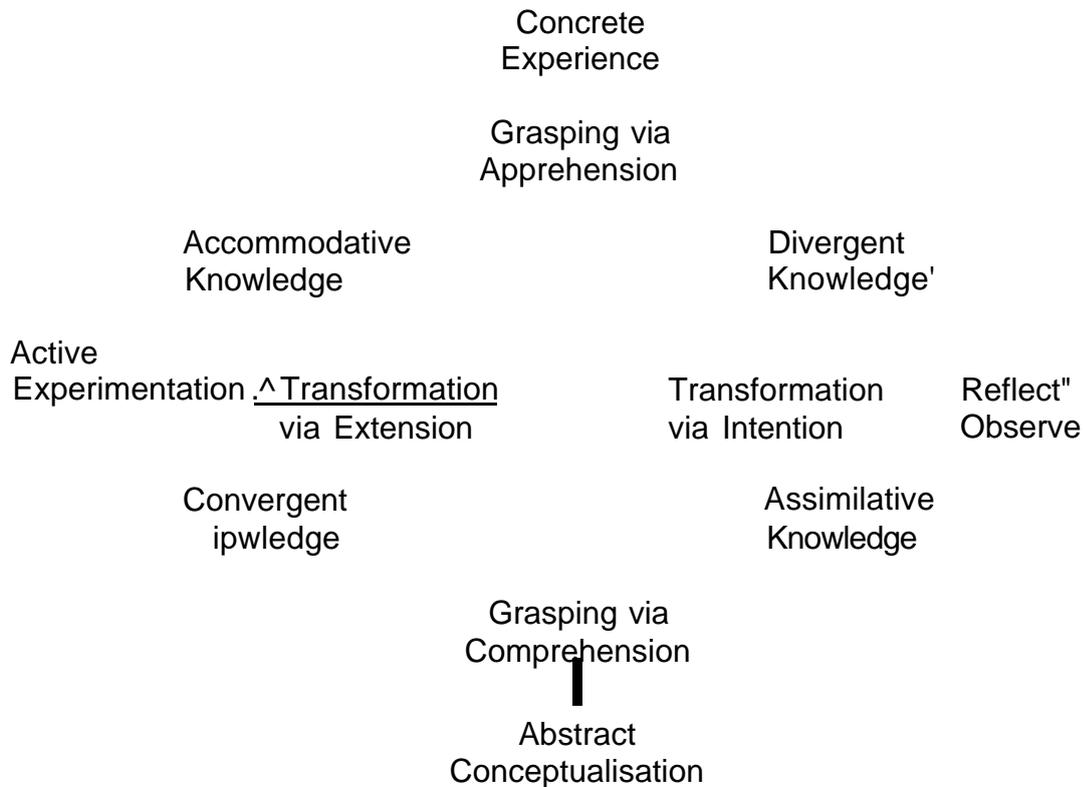
The VSM theory is based on cybernetics science of effective organization, describes the general principles of growth, learning and adaptation in complex and dynamic systems. These principles provide limitations on what is possible and guidance towards what is efficient. There are many possible designs for a viable system model of formal organization. Since the model is explicitly based upon principles of cybernetics, it facilitates consideration of what is and is not possible within COLTS context in formal organizations and provides guidance in creating efficient structures.

VSM uses a set of conventions that provide in effect, a language for discussing effectiveness. These conventions of the viable system model along with the concepts of cybernetics provide a language for discussing effectiveness. There is a need for self-questioning and revitalization in

the organization's language: speaking, listening, understanding and conversation. From the process of using VSM in COLTS context one agrees with Argyris (1978) that organizations must have an established process for transmitting a skill from individuals to the whole organization or community, not genetically but through direct communication. This can speed up learning in a school. VSM specifies five broad functions that must be carried out in any organization that manages, maintains internal stability and adapt to a changing environment. The VSM also specifies the information flows including the operational element interactions of environment with operations with management with models.

HOW CAN VSM AND COLTS (THEORY AND PRACTICE) REFLECTION BE USED AS A SOURCE OF LEARNING AND DEVELOPMENT IN A SCHOOL

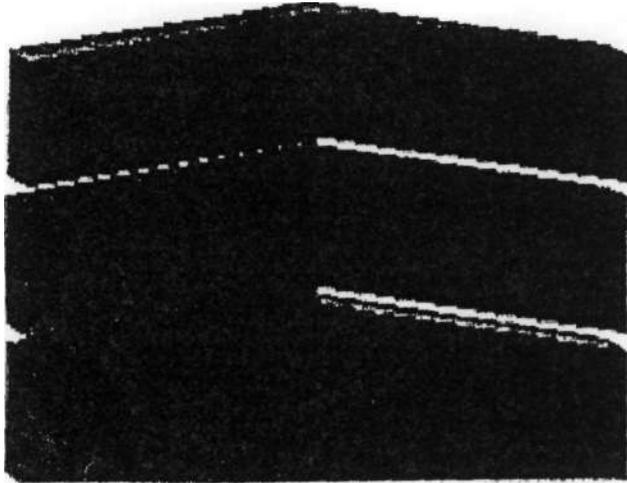
The application of VSM in COLTS context should be taken as a reflective activity that involves the perceptions of the relationships and connections between the parts of an entire school. The Kolb's dimensions of experiential learning should be incorporated in this marriage of VSM and COLTS discussion. Once VSM theory is applied to COLTS issue, the experience must be transformed into learning and knowledge. Kolb (1984) stresses that learning is the process whereby knowledge is created through the transformation of experience and knowledge results from the combination of grasping experience and transforming it. The diagram below illustrates the point:



Adapted from KOLB 1984: Knowledge Results from a Combination of Grasping it and Transforming.

Therefore, in a school, various role-players, actors, and beneficiaries or clients and owners will learn effectively when this VSM and COLTS process has an experiential component that is learning by doing.

This experiential component in VSM and COLTS process can be achieved through examining the process of reflection in three stages. These stages should not be viewed as discrete stages, but as elements of the whole.



3. Learner re~evaluates the experience

2. Learner recognises the feelings generated by the experience

1. Learner returns to the experience

Adapted from GIBBS 1987: Reflecting on Learning

Firstly, everyone involved in school must replay or recall new details or experiences during the process of using VSM in COLTS context. Secondly, everyone should attempt to recognize and accept the feelings; emotions and perceptions (both positive and negative) generated by the experience of the process. Finally, everyone must re-evaluate the experience of the process by analyzing its meaning, relationship with existing knowledge. In this stage identification of several aspects is crucial such as:

1. Association, that is relating experience to what is known.
2. Integration, that is seeking relationships amongst the data and drawing conclusions through using a process of synthesis.

3. Validation, that is determining the authenticity of ideas and feelings, testing for consistency, using rehearsal.
4. Appropriation, that is making knowledge one's and part of a value system

From this experiential learning cycle, everyone in VSM and COLTS context in school can observe and reflect so that formulation of new concepts, principles and strategies for action are in place. The emphasis is not having practical experiences but using such experiences to move through to higher levels of learning. The VSM and COLTS context need to be structured such that it includes, understanding of the COLTS situation, diagnosis of COLTS issue, creation of alternative solutions, predictions of outcomes, choosing among alternatives and communicating the results of analysis.

In experiential learning, experience is used to test out ideas and assumptions rather than to passively obtain practice. It is an active exploration. Moreover, experiential learning is not the same as discovery learning. Activities are carefully designed by the role players or stakeholders and must reflect on their experience in a meaningful way. Figure 12 below illustrates learning styles and experiential learning by doing supporting the idea that everybody in a school should be learning through doing in the application of VSM in COLTS context.

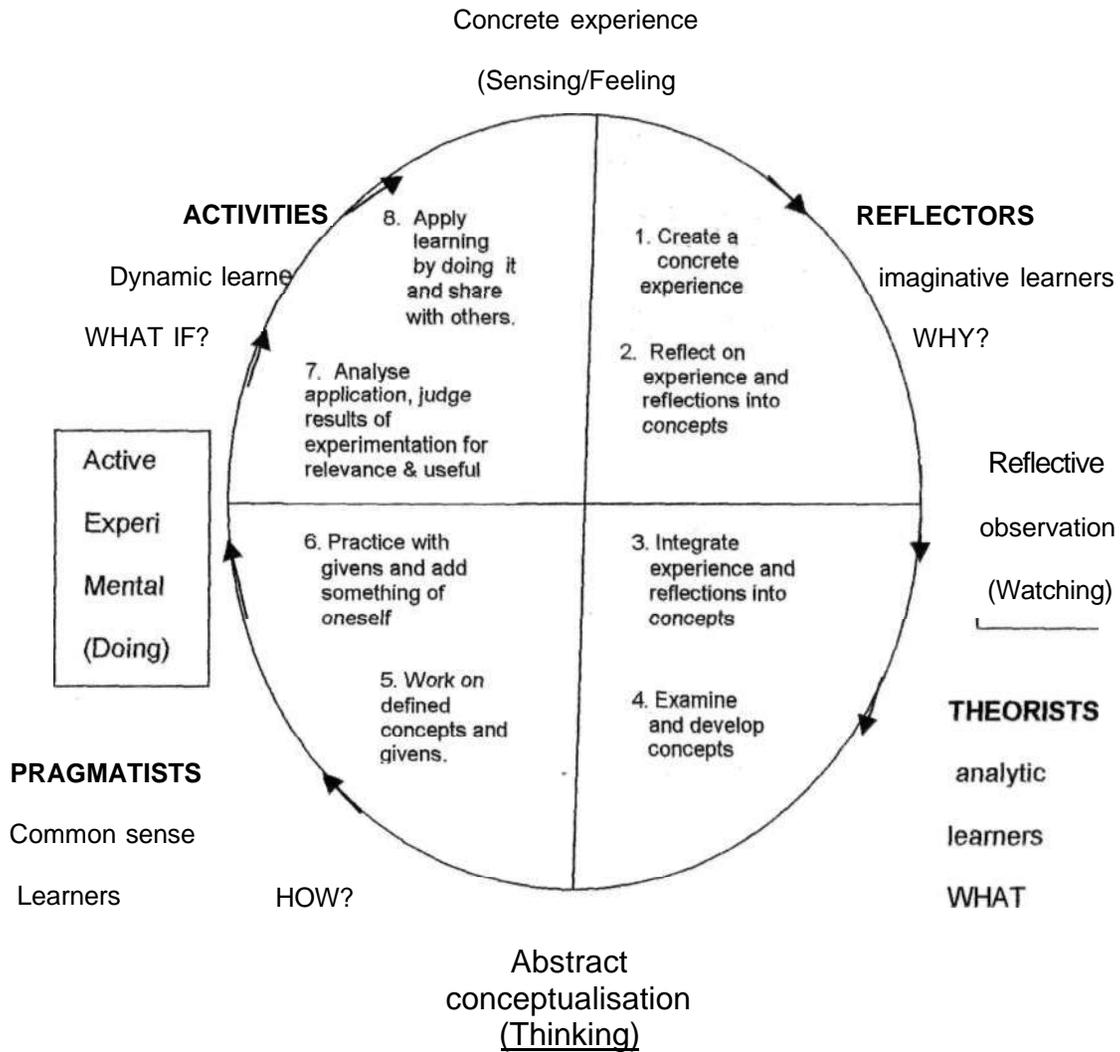


Fig 12 Adapted from KOLB 1984: Experiential Learning: Learning by doing

To achieve learning and development in VSM and COLTS context, the school needs to practice new behaviours and skills, receive feedback and integrate new skills into ways of thinking and behaving.

HOW COULD VSM THEORY BE MODIFIED TO IMPROVE ITS RELEVANCE

Having exposed the strengths of VSM, one has to recognize and highlight VSM limitations for interested people to take further the conversation and process. VSM as a social system model should respect the self-reflective individuals who participate in and attribute meaning to their situations and facilitate their awareness of the purposes being served. The VSM should not be concerned only with the effectiveness and efficiency of means or tools employed to achieve some end. The model should attempt to devise processes in which different perceptions of reality are continuously negotiated and renegotiated.

The VSM can be seen as an insufficient control model for organizations because the control devices will be in place to encourage conformity with sub-goals supporting these purposes and discourage any form of deviancy. Therefore, particular structures are likely to become fixed and binding, inhibiting the constructive development of the organizations. Therefore, both individual and collective competence are likely to suffer as alternative possibilities are neglected, Espejo and Harnden (1989)

The VSM should concentrate on providing mechanisms to generate intrinsic motivation that is distributing the source determining the system's goal-state and purpose throughout the system, according to Leonard (1999). It is interesting that Leonard (1999) agrees that VSM is capable of generating a degree of intrinsic control, which is spreading the sources of

control throughout the architecture of the system. The other part that requires improvement in VSM is information processing. There is a distinction between the syntactic and semantic-pragmatic levels of communication.

The syntactic level is solely concerned with whether a message is well formed or not, in a sense that it can be read. On the other hand, semantic and pragmatic levels are concerned with the meaning and significance of messages for the receiver. Thus the concept of requisite variety that underpins the VSM, operates only at the syntactic level. Though the semantic-pragmatic criterion is there throughout cybernetics it seriously constrains theoretical development and practical relevance.

The existence of power relationships and culture in VSM is believed to be another area that needs to be revisited. The issue of how much autonomy to grant to the parts is settled as a matter of managerial convenience in the interest of those who possess power. Leonard (1999) suggests that the goal setting should be a privileged function of higher-order levels of the system. The critique of VSM emphasizes that it is concentrating on systemic or structural constraints rather than the processes of negotiation between different viewpoints and value positions.

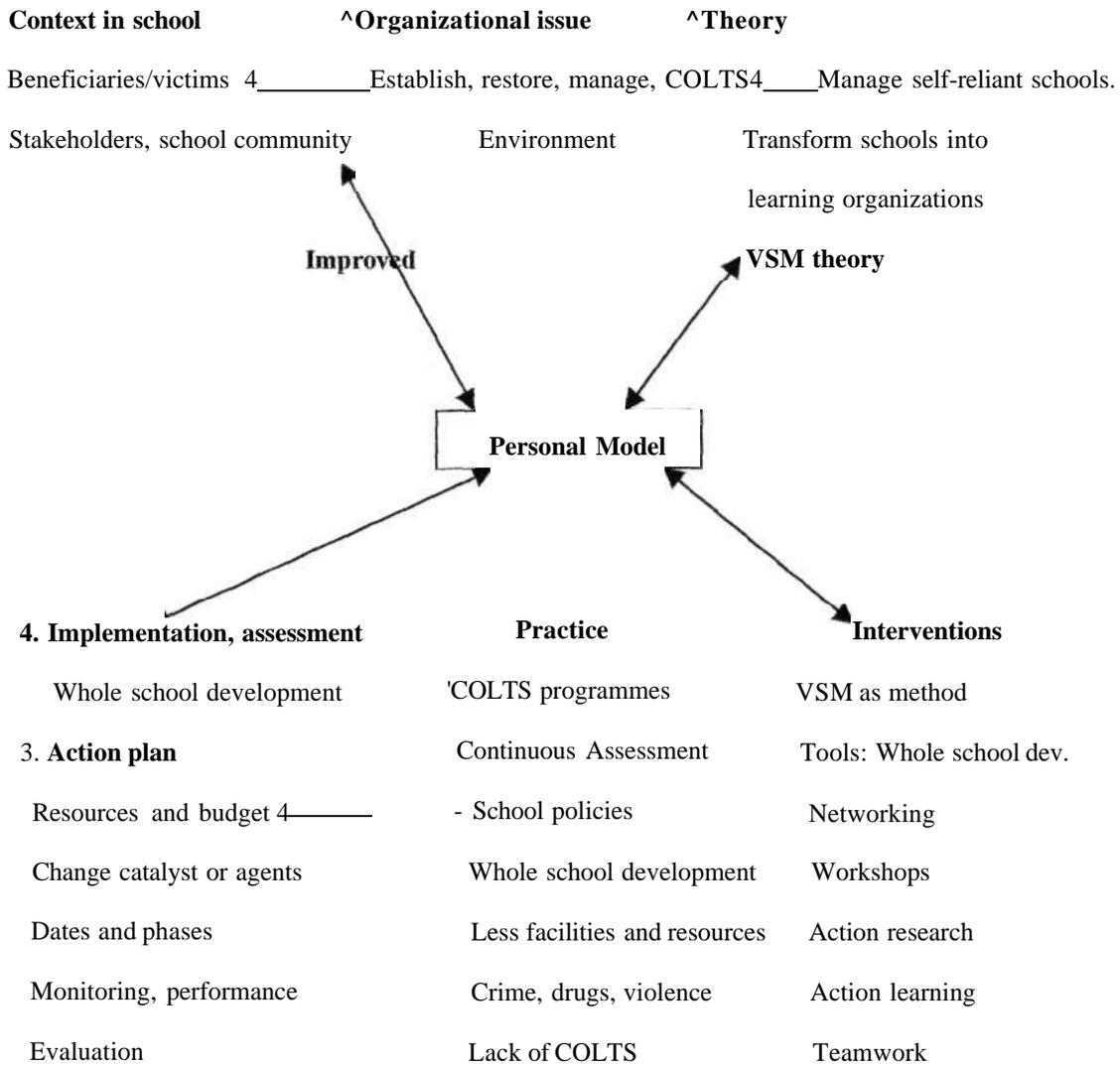
However, the VSM in the organizational setting of COLTS is genuinely supportive of the emergence of shared purposes. It may not serve all

purposes equally but as a management tool it does increase efficiency and effectiveness whatever the nature of the organization involved.

4.5 PERSONAL LIVING MODEL FOR SYSTEMATIC MANAGEMENT AND COLTS MAINTENANCE

The model for systematic management is a self-reflective process of how one can deal with COLTS issue in an organization with the help of understanding VSM. This model can guide the school to analyze the situation and apply this change intervention model.

4.5.1 CHANGE INTERVENTION: APPLICATION OF VSM IN COLTS - AN ORGANIZATIONAL SETTING



2. Priorities

Reflect school value/

Quality COLTS

1. Establish common concern, .4.

Vision, understanding amongst

Stakeholders

Change intervention: Application of VSM in COLTS an organizational setting

Fig 13 Change intervention.

4.5.2. Maintaining COLTS in school: The Toulmin Argument Model

The advantage of this model is that it allows strategic planners to be flexible about different information aspects of the decision situation. The Toulmin's argument model illustrates the relationships among the COLTS elements and how to assess these elements to support an organizational issue by presenting guidelines for organizational action. Since most management decisions are based on some sort of information, the information should be supported by Toulmin's six components such as claims, evidence, warrants, backing, qualifiers and rebuttals.

Therefore, the statements of reasoning which support the argument is be clear, be relevant data, consistent and valid.

Maintaining COLTS in school: The Toulmin model

Evidence

- School with resources provides high quality of service. Restoration and maintenance of COLTS at such schools.
- Learners' potential and skills are developed
- Enhance learner's knowledge
- Gains good reputation

Claim

- Resources are necessary for restoration, establishment and maintenance of COLTS at schools

Warrant

- A school with enough resources will produce better results
- A school with resources, facilities and good results attracts sponsorship and more prospective students and educators.

i

Backing

- Department of education and donors are committed to the delivery and provision of sufficient facilities and resources at schools.
- COLTS' restoration at schools
- Improvisation of facilities and resources at schools.

Rebuttals

- Counter claim: schools should improvise and maximise the little resources they have.
- Counter data: some schools with enough resources fail to manage their resources and COLTS is lacking
- Other schools with or without resources maintain COLTS and perform good
- Counter warrant: The Dept of Education Provides schools with equal resources, minimize imbalances in resources

Fig 14 Resources are necessary for Maintaining COLTS in school: The Toulmin Argument Model

4.6 CONCLUSION

The school as an organization has to seize opportunities created by the process of using viable system diagnosis as an intervention tool for restoring an organizational issue of COLTS. Mechanisms need to be put in place to make best use of new concepts, principles and strategies gained during the process. The supportive elements are to be intensified and weak elements are to be strengthened to maintain cohesiveness of the

departments in school. The school should draw on multiple resources inside, and outside the school to ensure coherence, stability and viability in establishing, restoring and maintaining a culture of learning, teaching and service.

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

INTRODUCTION

This chapter gives conclusions on the Viable System Model theory as a methodology that can be used as a pointer for understanding an organizational issue of COLTS in a school. There are also conclusions on VSM as a useful methodology, VSM and COLTS relationship and lessons of using VSM in COLTS situation. Recommendations on COLTS as an organizational issue are included.

CONCLUSIONS ON VIABLE SYSTEM MODEL AS USEFUL METHODOLOGY

The importance of VSM as an intervention tool in COLTS organizational setting is that, it provides an enabling milieu to managers and concerned parties who are trying to design and operate goal-seeking, adaptive systems. The methodology favours and facilitates the emergence of shared purposes by insisting that viable organizations should possess policy-making bodies and control should be decentralized. The VSM comprises management components that are essential if a set of activities is to comprise a system capable of purposeful activity.

VSM methodology specifies a number of conditions that must be met if an organization is to simultaneously maintain internal stability and adapt to its

environment. It is however, at the same time concerned with what defines a system and enables it to maintain its identity. In other words, the methodology does not try to provide a detailed blueprint for design. This becomes a powerful tool for providing a framework for restructuring decision-making processes and monitoring controls in an organization. Above all, VSM theory offers a mental tool to approach the creation and design of effective contexts for the participation of people in human activities. Therefore, the methodology offers a paradigm for problem-solving situations.

VSM is an aid to management and all actors in their quest for change, that is, both change as a promise and as a threat in organizations. From the theoretical and methodological perspective, an application of VSM requires the interpretation of the expression of various distinct viewpoints within the system in-focus which generate a multi-systemic expression of the social enterprise.

VSM as a method has helped create COLTS activities that are able to innovate and evolve thus meeting the challenges and demands of changing environments. In addition, VSM theory suggests that innovative school activities should be designed as a learning system that places primary emphasis on being open to inquiry and self-criticism. The truly innovative school will need an ethos and holographic spirit where attitudes, abilities and values desired in the whole are enfolded in the parts. The VSM enable COLTS activities to deal better with uncertain and

complex problems in ways that go well beyond the capacities of any individual control.

The school as an organization rests in shared systems of meaning, shared interpretive schemes that create and recreate the meaning. So, VSM provides a new focus and an avenue for the creation of organized action. In COLTS context everyone has to see herself or himself as a symbolic actor whose primary function is to foster and develop desirable patterns of meaning. The VSM shows this form of symbolic management if used to shape the reality of COLTS organizational life and it enhances the possibility of coordinated action.

A VSM encourages one to reinterpret the nature of school organizational concepts, processes, and structures so as to recognize the role one plays in the social construction of reality. VSM theory help to empower the school to appreciate that they themselves sometimes create the constraints, barriers and situations that cause them problems since COLTS organization will be their extension.

The relevance and significance of the application of VSM in COLTS issue is that it offers the school with its own interpretation of the model, explicating insights into COLTS structure and organization's viability. Moreover, the language offered by VSM reflects the interactions of people in human activity systems by becoming a pointer for action for all levels within the entire organization. Since, the model has been used as

diagnostic tool and for design purposes in COLTS issue, it has highlighted the elements with harmonizing effects, the common faults or discord and constraints in the organization.

CONCLUSIONS ON COLTS AND VSM RELATIONSHIP

The school as an organization is characterized by many changing circumstances and a need for innovations. The changing circumstances and innovations call for different kinds of action and response. One may summarize the challenges and opportunities for transformation in a school as:

1. Management of Teaching and Learning Programmes (COLTS)
2. New Curriculum
3. Maths, Science, Technology and Engineering
4. Quality Assurance
5. Gender Equity in Education
6. Information Technology
7. Educational Management Development
8. Human Resource
9. Whole School Development

Therefore, in COLTS and VSM relationship the flexibility and capacities for action become more important and essential than narrow efficiency in a school. VSM in a school encourages people to take an interest in the

school organizational life, whereby people can challenge and question what they are doing in a substantial rationality.

The substantial rationality in VSM and COLTS marriage is where people are encouraged to determine whether what they are doing is appropriate and to adjust actions accordingly. The COLTS context requires actions that are informed by intelligent awareness of the complete situation. For example, if one takes the educational institution as a mechanistic organization, it discourages initiative and encourages people to obey orders without questioning. As a result people feel powerless about problems which they collectively understand and ultimately have the power to solve. Both employees and school organization lose from this way of thinking or approach.

But, using VSM theory the school community can not lose opportunities for personal growth, the creative and intelligent contributions that most employees are capable of making given the right opportunities. Therefore the application of VSM as a methodology in COLTS enhancement in a school yield results such as:

- 1 the school organizational forms could adapt easily to the changing circumstances.
- 2 it results in inquiring minds and questioning organization.

- 3 it anticipates the desirable results as the interest of those working in the organization taking precedence over the goals the organization is designed to achieve.
- 4 it strengthens or amplifies the humanizing effects upon employees both at the lower and higher levels of the organizational hierarchy.

Thus the problems arising in the school organization can be approached in a holistic way rather than a fragmented pattern.

COLTS and VSM relationship reflects that the understanding of relations between organization and their environment are open systems and should be understood as an ongoing processes rather than collection of parts. Thus the survival of a school as an organization is seen as primary task and a process whereas school goals are targets or end points to be achieved. Therefore, in the school the management engages in the reorientation of specific goals that are framed by a more basic and enduring process that help prevent them from becoming ends in themselves, which is a common fate in some organizations.

Therefore, one views COLTS organizational structure, technology, strategy, human and managerial dimensions of organization as subsystems with living needs that must be satisfied in a mutually acceptable way. The principal advantage of COLTS and VSM relationship in this case is that in identifying different elements of school organization, one is alerted to the fact that in organizing one always has a range of

options. This emphasizes that school managers and those involved in school organizational designs always have choice and that effective organization depends on the quality of choice.

CONCLUSIONS ON IMPORTANT LESSONS OF THE STUDY

The application of VSM in school organization encourages one to understand how change unfolds through circular patterns of interaction. Thus school organizational members acquire a new way of thinking about circular systems of relations to which they belong. Therefore, in COLTS context people should understand how these relations are formed and transformed through processes that are mutually determined.

A Viable system model helps one to think in terms of loops rather than lines and to replace the idea of mechanical causality with the idea of mutual causality. For example A causes B (educator's effort causes student to pass) A and B may be co-defined as a result of belonging to the same system of circular relations, (educator's effort and student's effort results in a pass).

The organizational issue of COLTS is regarded as a complex situation in a school. The logic of such systems rests in the network of relations that define and sustain patterns of causality. But, VSM reaffirms the power of this kind of mutual causality no matter how complex systems are. VSM and COLTS relationship provides help in school organization by:

1. Attempting to map system relations and identify their principal tendencies, rather than attempting to manipulate artificial causes and effects.
2. Attempting to identify the principal subsystem or nests of loops that hang together.
3. Modify their relations when necessary by reducing or increasing the strengths of existing linkages and adding or removing loops.
4. Gives particular attention to the loops joining different sub-systems and how local action reverberate throughout the whole, organization.

In understanding the logic of mutual causality one has a means of appreciating how the explicate reality of organizational life unfolds and is transformed on an ongoing basis by a wider system of relations in which it occurs. When one applies VSM in COLTS context in school organization, one arrives at a much rich picture of the system under consideration. One finds that the problem with which one starts becomes part of the larger problem requiring a broader focus. For example the high failure rate in matric students resides maybe with parents, educators, norms of pass or fail of the education system, political or a cultural milieu of the school organization. This broader and deeper analysis adds to the complexity of the overall picture, and may identify new ways of solving the problems of a specific nature.

VSM theory provides an attempt to fathom the nature, source of change and problems in COLTS context in school so as to understand the logic. VSM in this way has succeeded in producing descriptions, classifications and explanations of the basic dynamics of COLTS in the school. With the help of VSM, the school as an organization benefits by grasping different aspects of the flux shaping external and internal environment in a school.

The strategies for flux help one to understand that problems may be a natural result of the logic of the system in which they are found. The VSM theory emphasizes that one is able to deal with the problems only by restructuring the logic. The application of VSM in COLTS in a school organization provides an effective means of dealing with organizational complexity.

VSM benefits COLTS situation by applying the method of analysis in practice in two steps, firstly it produces a diagnostic reading of the situation being investigated using principles of viable system diagnosis to identify or highlight key aspects of the situation. Secondly, it makes a critical evaluation of the significance of the different interpretations thus produced. It is through these steps that one can explore the complexity of COLTS issue in school.

The principle of requisite variety in VSM reveals an important point that there is a close relationship between the way we think and the way we act. Thus, many school problems are embedded in our thinking. This has

important results; firstly it encourages people to take ownership of the part they play in shaping the problems they have to solve. This kind of acceptance provides an empowering effect since it brings partial responsibility for many problems to one's doorstep and opens lines of action that were closed. Secondly, an appreciation of the close relationship between thoughts and actions can help to create new ways of organizing.

CONCLUSIONS AND RECOMMENDATIONS ON COLTS - AN ORGANIZATIONAL ISSUE

The application of VSM in COLTS recommends that the management of learning, teaching and service programmes in a school require school community to have critical thinking, problem-solving and communication skills. The opportunities and challenges exposed by this application enable the school community to make a real paradigm shift in delivery of its core business. The study concludes that, the success of COLTS in a school depends on the commitment and active participation of all stakeholders, learners, educators and parents in dealing with:

- School's shared vision and mission.
- School becoming a learning and self-reliant organization.
- School involved in organizational audit.
- School re-inventing and re-engineering organizational breakdowns.
- School's mental models, conversations and reflection surfaced.
- School's language and culture.

For a school to become a learning organization, it needs to understand metaphors or images reflected on the organization. The COLTS issue is used as a means of enhancing one's capacity for creative yet disciplined thought, whereby one has to grasp and deal with many school's sided character of organizational life. The process of using VSM in COLTS organizational issue emphasizes that the real challenge is to learn to deal with the complexity of school and its external environment. It is envisaged that this approach (use of VSM as methodology in COLTS issue) empowers schools to build their capacity to manage themselves and remain viable.

REFERENCES

1. Ackoff, R.L. (1971) Towards a system of Systems concepts'.
Management Science. 17 (11), 661-71.
2. Argyris, C. (1966) *Integrating the Individual and the Organisation*,
New York. John Wiley and Sons.
3. Argyris, C. (1978) *Organisational Learning: A theory of Action
Perspective*. Reading Mass: Addison-Wesley.
4. Beer, S. (1972) (2ed) *Brain of the Firm*. Chichester. John Wiley and
Sons.
5. Beer, S. (1967) (2ed) *Cybernetics and Management*. London.
Fletcher and Sons Ltd.
6. Beer, S. (1985) *Diagnosing the System for Organisations*.
Chichester. John Wiley and Sons Ltd.
7. Beer, S. (1966) *Decision and Control The meaning of Operational
Research and Management Cybernetics*. Chichester. John
Wiley and Sons Ltd.
8. Beer, S. (1975) *Platform for Change*. Chichester. John Wiley and
Sons Ltd.
9. Beer, S. (1979) *The heart of Enterprise*. Chichester. John Wiley and
Sons Ltd.
10. Beer, S. (1994) *Beyond Dispute: the invention of team Syntegrity*.
Chichester. John Wiley and Sons Ltd.
11. Bertalanffy, L. (1962) 'General System Theory - A Critical Review'.
General Systems 7, 1-20.

12. Boyd, G.M. (1981) 'Systems and Cybernetic Theory as a Core Component in the Education of Professional Educators'. In Reckmeyer (Ed), *Proceedings of the 25th annual North American Meeting of the Society For General Systems Research*. Louisville, K.Y. SGSR.
13. Boyd, G.M. (1980) 'Essential Elements of prescriptive cybernetic models for educational operations.' In R. Trappl (Ed) *Proceedings of the 5th International Meeting on Cybernetics and Systems Research*. New York. Hemisphere.
14. Boyd, G.M. (1981) 'Systems and Cybernetic Theory as a Core Component in the Education of Professional Educators'. In Reckmeyer (Ed), *Proceedings of the 25th annual North American Meeting of the Society For General Systems Research*. Louisville, K.Y. SGSR. *
15. Boyd, G.M. (1980) 'Essential Elements of prescriptive cybernetic models for educational operations.' In R. Trappl (Ed) *Proceedings of the 5th International Meeting on Cybernetics and Systems Research*. New York. Hemisphere.
16. Bornman, L.(1992) *Managing for Learning .People Dynamics*. 10 (8), 19-22.
17. Bung, K. and M. Lansky (1978)'Educational Cybernetics'. In D. Unwin and R. McAleese (Eds) *The encyclopaedia of educational media, communications and technology* (pp. 266-306) London. NewYork. ,Inc.

18. Butler, D. (1999) *Managing Self-reliant Schools. Manual .Sacred Heart R&D.*
20. Checkland, P (1981) *Systems Thinking, Systems Practice.* NewYork. Wiley Books.
21. Churchman, C.W. (1979) *The Systems Approach and Its Enemies.* NewYork. Basic Books Inc.
22. Clemson, B. (1984) *Cybernetics: A New Management Tool.* Turnbridge Wells Kent. Abacus Press.
23. Denton, J. (1998) *Organisational Learning and Effectiveness.* London. Routledge.
24. Department of Education. Directorate (October 1997) *Education and Training-An implementation Plan. Pretoria. Department of Education.*
25. Department of Education. Department of Education (27 January 1997) *Campaign on COLTS: Working Document revised after the Council of Education Ministers Meeting. Pretoria. Department of Education.*
26. Department of Education (18 March 1999) *Education Programmes Directorate: COLTS.* Durban. Department of Education.
27. Department of Education (22-24 August 1997) *Consultative Conference: COLTS.* Durban. Department of Education.
28. Department of Education (8-9 May 1998) *Consultative Conference: COLTS.* Durban. Department of Education.

29. Drucker, P.F. (1994) *The Theory of the Business*. Harvard Business Review. Sept/Oct.
30. Dyer, W,W,Daines,R,H,and Giauque,W,C.(1990) *The Challenge of Management*. London. Uarcourt Brace Jovanovich Publishers.
31. Espejo, R. and Harnden, R. (eds.) (1989) *The Viable System Model: Interpretations and Applications of Stafford Beer's VSM*. Chichester. John and Wiley Sons.
32. Espejo, R and Schuhmann, W. and Schwaninger, and Bilello, U.(1996) *Organizational Transformation and Learning. A Cybernetic Approach to Management*. Chichester. John Wiley and Sons.
33. Gibbs, G. (1987) *Learning by doing: a guide to teaching and learning methods*. Birmingham. Polythecnic.
34. Gibson , J. L, Ivancevich, J. M and Donnell, J.H (1994). *Organizations: Behaviour, Structure, Processes*. (8ed) Boston: IRWIN.
35. Goodman ,M (1997) *Designing a systems Thinking Intervention: A strategy for leveraging change*. Cambridge M.A. Pegasus Communications.
36. Harrison, E.F. (1978) *Management and organizations*. Boston. Houghton, Mifflin.
37. Jackson, M. (1989) *System Methodology for the Management Science*.
38. King, N and Anderson, N (1995) *Innovation and change in organizations*. London. Routledge

39. Kolb, D.A. (1984) *Experiential Learning: experience as the source of learning and development*. New Jersey. Prentice Hall.
41. Leonard, A. (1999) *A Viable System Model*. Journal of Knowledge Management Practice. August.
41. Mintzberg, H. (1994) *Managing Global Economic and Technological Change*. Cambridge.
42. Morgan, G.(1986) *Images of Organizations*. London: Sage Press.
43. Oldcorn,R.(1996) *Management* (3rd ed) London :Macmillan.
44. Paul, R (1993) *Critical Thinking: What every person needs to survive in a rapidly changing world*. Sonoma State university, Rohnert park.
45. Ringland, G. (1998) *Scenario Planning: managing for the future*. New York. John Wiley and Sons.
46. Schein, E.H. (1993) *On Dialogue, Culture and Organizational learning*. Organizational Dynamics. Winter, 40-51.
47. Syncho and Associates (1992) *Introduction to the Viable System Model: A management Briefing*.
48. Senge, P. (1992) *The fifth Discipline: The art and practice of learning organisations*. London. Century Business.
49. Travers, M.W. (4 Ed) (1977) *Essentials of Learning*. New York. McMillan.
50. Van der Heijden, K. (1996) *Scenarios: the art of strategic conversations*. Chichester. John Wiley and Sons.
51. Wilson, B. (1990) *Systems: Concepts, Methodology and Applications*. (2nd Ed) Chichester. John Wiley and Sons.

52. Zammuto, R .F. (1982) *Assessing organizational effectiveness*.

Albany. University of New York Press.