THE DEVELOPMENT, IMPLEMENTATION AND CERTIFICATION OF SANS ISO 9001:2000 WITHIN FIVE OF THE SECTIONS OF THE INDUSTRY ASSOCIATION RESOURCE CENTRE (IARC)

By

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Submitted in partial fulfillment of the requirements for the degree of Master of Commerce (Strategic Project Leadership and Management) to the faculty of Management Studies, University of KwaZulu-Natal

DATE: NOVEMBER 2005

ABSTRACT

This research paper presents a systems and process approach into the development, implementation and certification of ISO 9001:2000 within the Industry Association Resource Centre, (IARC) formally known as Distribution Technology (DT). There is currently no formal Quality Management System (QMS) applied within the bounds of IARC. ISO 9001:2000 is one such system that is to be implemented to ensure that the products and or services as generated by IARC meet the customers expectations and within the required time frame.

Due to the restructuring of the EDI and disbanding of Distribution, DT was relocated from the disbanding Distribution division and incorporated into the R & S division. In doing so DT was restructured and the name changed to IARC. This meant that Risk Management a previous section within DT was moved out and three new sections, Standardisation, Information Centre and the Electricity Supply Industry – Geographic Information System were incorporated into IARC. The three new sections had previously been with R & S and were already ISO 9001:2000 certified.

IARC is currently split into eight sections namely;

- Technology Development, Power Plant,
- Technology Development, Control Plant,
- Engineering Processes,
- Technical Training,
- Pre-Paid Development,
- Technology Standardisation,
- Information Services and
- Electricity Supply Industry – Geographic Information System

There is also however a Corporate Consulting Service supplied by IARC.

IARC is further spread throughout the country and thus has multiple offices namely;

- Megawatt Park (Johannesburg)
- Menlyn Park (Pretoria)

- New Germany (Durban)
- Brakenfel (Cape Town)
- Simmerpan (Germiston)
- East London
- Klerksdorp
- George

As can be seen from above IARC is a department that is multi skilled and spread through out the country hence the importance of implementing a quality management system.

A method of developing and implementing ISO 9001:2000 within IARC will be discussed .

This research paper will further only involve five of the sections within IARC as three of the sections as stated above have already achieved ISO 9001:2000 certification..

Thus the five sections that form part of this research paper are;

- Technology Development, Power Plant,
- Technology Development, Control Plant,
- Engineering Processes,
- Technical Training and
- Pre-Paid Development

The sections within IARC have in the past worked in isolation from each other and thus have built up their own reporting systems to which they adhere to.

It is thus recommended to involve the relevant staff throughout the entire IARC and to ensure that they fully understand the benefits that can be achieved with certification. It is further important to understand that extensive training be undertaken throughout IARC during the process to educate all staff.

ACKNOWLEDGEMENTS

I would like to thank the people listed below who gave up their time, support, understanding, knowledge and experience throughout this journey in the preparation of this dissertation.

My beautiful wife, Vashti and our two loving children, Basil and Garrick who continually supported and encouraged me along this journey.

My mother Shirley, whom I would like to dedicate this research paper to for all her Love and Generosity shown in raising my brothers and myself as a single parent after the untimely death of my beloved father, Basil.

Stanley "Stan" Hardmen, my supervisor, for all his hard work and assistance.

Stella Jory, for her inspiration and encouragement.

Andre Bekker, for his full understanding, support and guidance during this period.

To all the other people not mentioned who helped me during this research paper, thank you.

DECLARATION

I the undersigned hereby declare that the work contained in this research paper is my own work.

Craig Bernard Clark

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LIST OF ACRONYMS

ESI	Electricity Supply Industry.
SOE	State Owned Enterprise.
EDI	Electricity Distribution Industry.
RED	Regional Electricity Distributor.
DT	Distribution Technology.
R & S	Resources and Strategy.
MD	Managing Director.
IARC	Industry Association Resource Centre.
ISO	International Organization for Standardization.
IAF	International Accreditation Forum.
SANAS	South African National Accreditation System.
SABS	South African Bureau of Standards (Pty) LTD.
SAACB	South African Association of Certified Bodies.
QMS	Quality Management System.
BSI SA	British Standards Institute South Africa.
UKAS	United Kingdom Accreditation System.
TQM	Total Quality Management.
MLA	Multilateral Recognition Arrangement.
SANS	South African National Standard.
WBC	Wires Business Committee.
HACCP	Hazard Analysis Critical Control Point.
TESCOD	Technology Steering Committee of Distribution.

Chapter 1

PROBLEM STATEMENT

1.1 INTRODUCTION

The Electricity Supply Industry (ESI) governs the Generation, Transmission and Distribution of electricity in the Republic of South Africa. Eskom is a vertically integrated operation that generates, transmits and distributes electricity, Eskom in turn generates 95% of the electricity used in South Africa. Eskom is further a State Owned Enterprise (SOE) which has one shareholder namely the South African Government. It falls under the portfolio of Minister Alec Erwin who is Minister of Public Enterprises.

See Figure 1-1, Organisational Group Structure

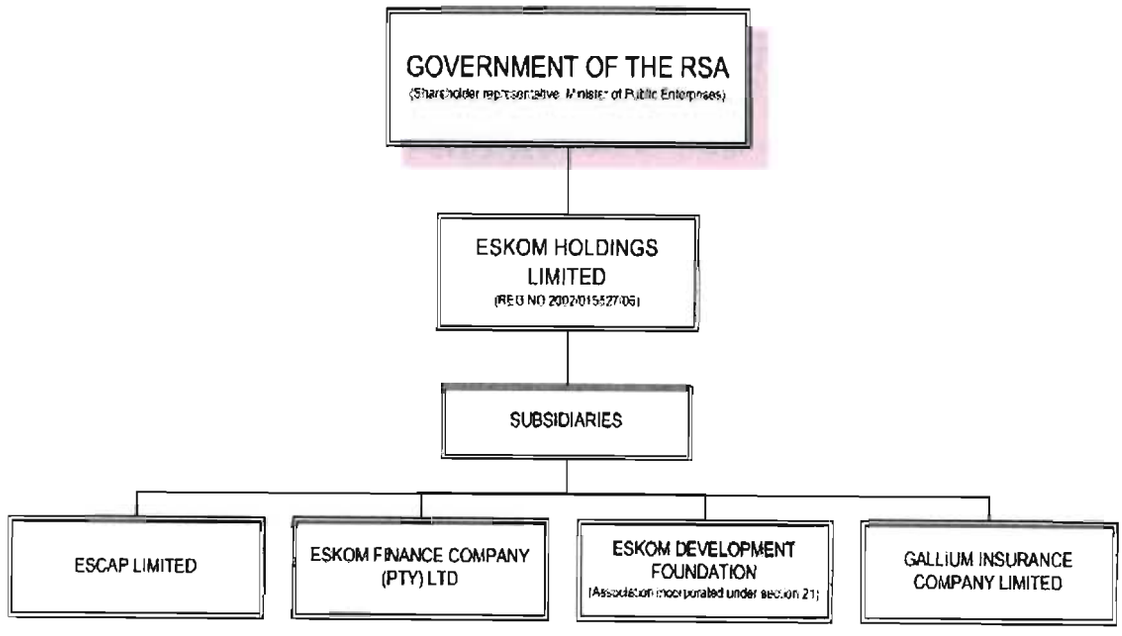


Figure 1-1, Organisational Group Structure

Retrieved June 06, 2005 from the World Wide Web,
http://www.eskom.co.za/content/1

See Figure 1-2, Governance Structure of Eskom Holdings Limited

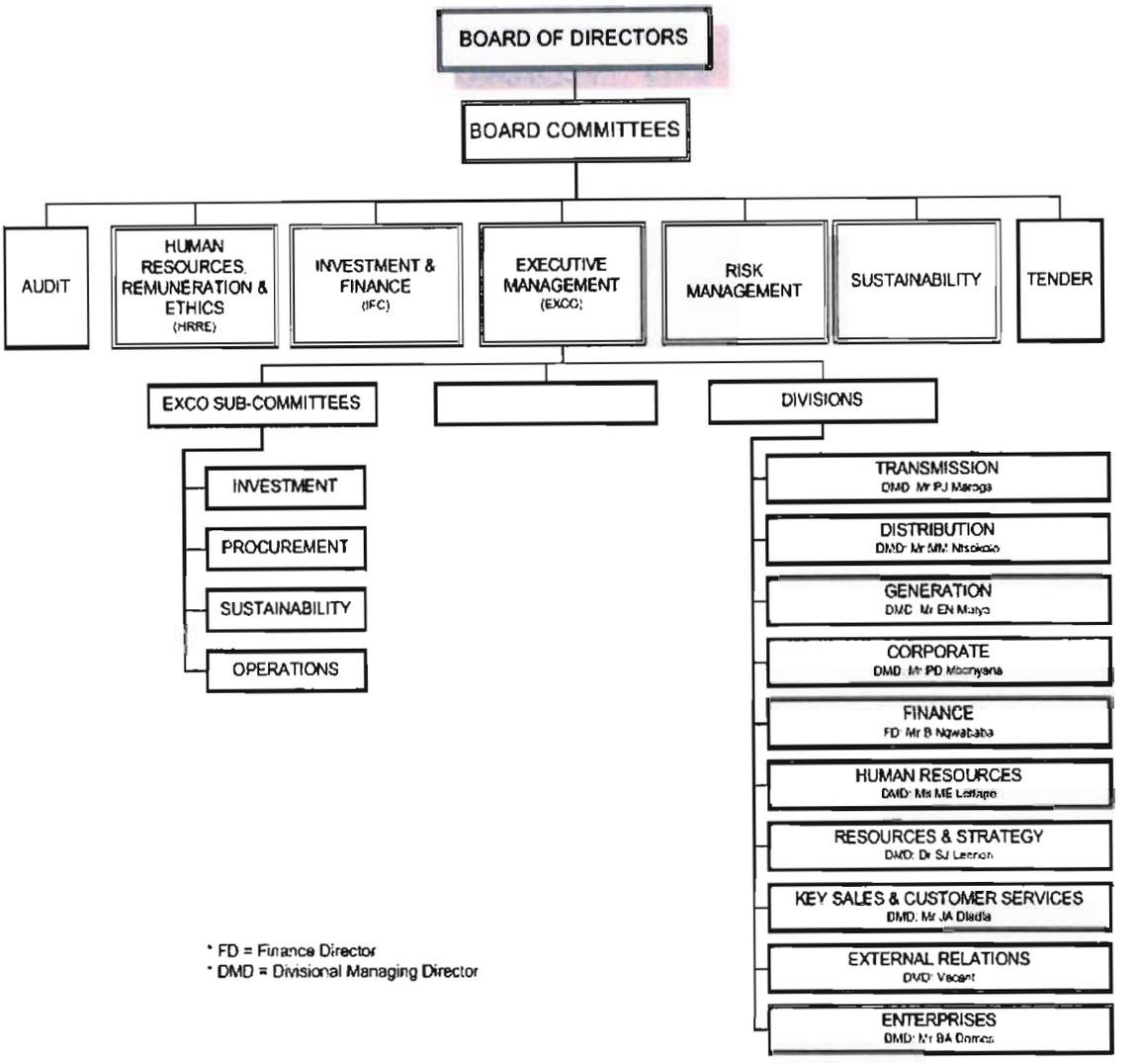


Figure 1-2, Governance Structure of Eskom Holdings Limited

Retrieved June 06, 2005 from the World Wide Web,
http://www.eskom.co.za/content/2

The strategic intent of Eskom is, "***to be the pre-eminent African energy and related services business of global stature.***"

Retrieved June 06, 2005 from the World Wide Web,
http://www.eskom.co.za/live/content.php?Category_ID=58

As can be seen from the above Eskom Holding's Limited consists of numerous divisions within the group. The Distribution Division however is in the process of disbanding and forming part of the Electricity Distribution Industry (EDI) and thus will no longer form part of Eskom Holdings in the future. The EDI will comprise of Distribution and the Municipalities thereby creating six Regional Electricity Distributors (RED's). The first of which is anticipated to be created in July this year and will be situated in the Western Cape, RED number 1.

See Figure 1-3, Geographical layout of the six RED's

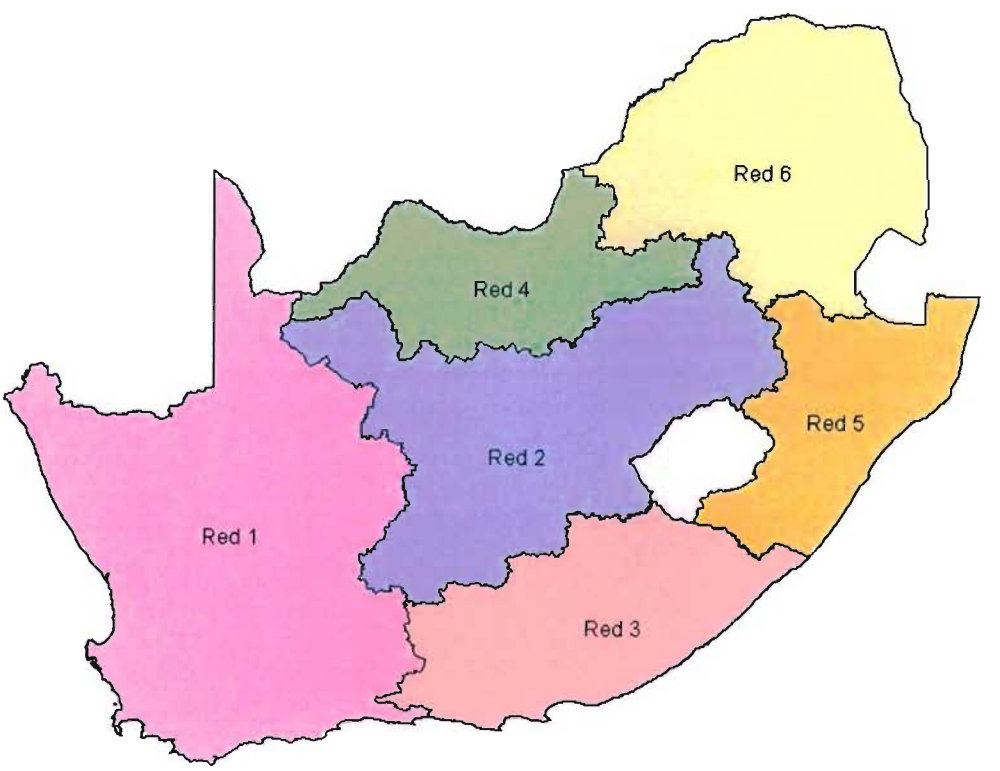


Figure 1-3, Geographical layout of the six RED's

Due to the restructuring Distribution Technology (DT) has been moved out of the disbanding Distribution Division and now becomes part of the Resources and Strategy (R & S) Division.

1.2 PROBLEM STATEMENT

The problem statement for this research paper arises from the fact that DT has been repositioned and now assumes a new function in a new environment. This move now has implications for DT and they are as follows;

- Instruction from the Managing Director (MD) Resources & Strategy (R&S) to obtain ISO 9001:2000 certification by the end of March 2006 and
- Industry Association Resource Centre (IARC) is no longer a so called "Protected Department" within Distribution that the Regions now RED's have to use.

Based on the above the Problem Statement for this research paper is as follows:

"*How should IARC design and implement a Quality Management System (QMS) and how then do we sustain IARC into the future?*"

Distribution Technology (DT) referred to from now on as the Industry Association Resource Centre (IARC) no longer forms part of the Distribution Division and therefore now finds itself in a new environment. IARC now falls within the bounds of the R&S Division within Eskom Holding's.

See Figure 1-4,Organisational Structure of Resources and Strategy

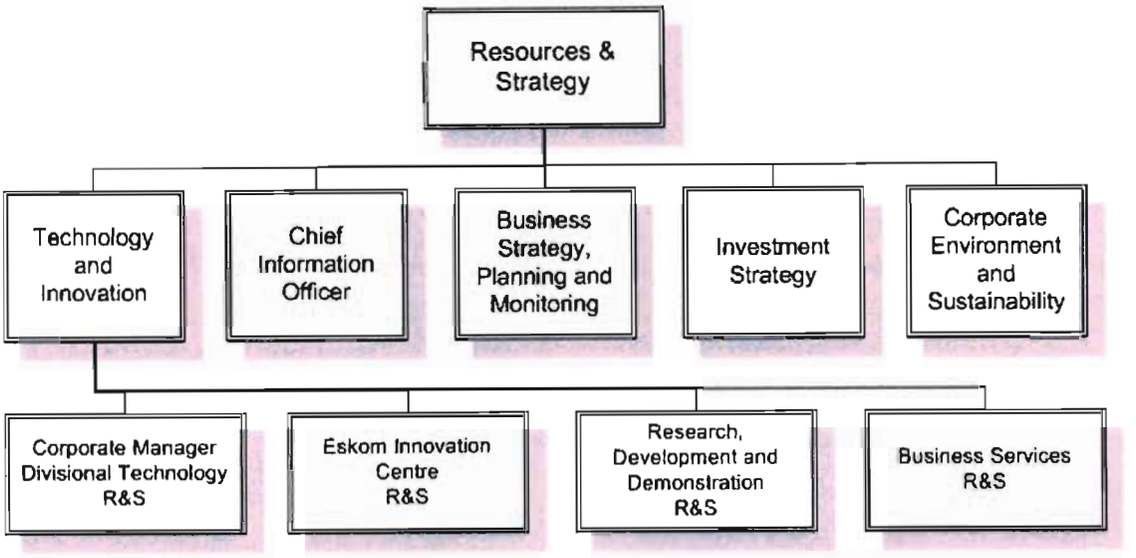


Figure 1-4,Organisational Structure of Resources and Strategy

1.2.1 Resources and Strategy.

IARC is positioned under the Corporate Manager Divisional Technology

1.2.1.1 Resources & Strategy Vision

Resources & Strategy Division is the motivating force behind the growth and sustainability of Eskom and its subsidiaries.

1.2.1.2 Resources & Strategy Mission

To realise Eskom's strategic intent through:-

Development and application of integrated business strategies

Relevant and aligned investments, RD&D policies, standards and systems

Effective market strategies

1.2.1.3 Resources & Strategy Values

Excellence

Integrity

Innovation

Challenge

Credibility

(Industry Association Resource Centre Business Plan 2005 / 2006)

1.2.2 Instruction from the MD R & S (Internal implication)

The Managing Director of Resources & Strategy, Dr Steve Lennon has instructed IARC to achieve ISO 9001:2000 certification by the end of March 2006. The reasoning behind the instruction is that all the departments in R & S are either ISO 9001:2000 certified or are in the process of achieving certification. 2000 is the latest version of the ISO 9000 family and thus supersedes the previous version, 1994. ISO 9001:1994 became obsolete as from the end the December 2003.

1.2.3 IARC no longer consider as a "Protected department. (External implication)

IARC formerly DT was previously a head office based department within Distribution and was therefore a so called "*Protected Department.*"

"*What was the significance of such a statement?*" This meant that the Regions had to make use of the services of DT.

"Who enforced this?" As all the Regional managers and the then Distribution Technology manager reported to the same Managing Director, direct control and leadership was easy to implement.

As IARC no longer forms part of the Distribution Division it therefore now finds it's self in a new environment. The Regions which are in the process of changing to RED's are no longer forced to make use of the services of IARC, hence the importance to obtain ISO 9001:2000 certification. This will ensure that the services and products produced by IARC meet and exceed the customers and stake holders requirements within the required scope, cost and time frame as set out by its customers.

See Figure 1-5, List of Customers and Products/Services for the Industry Association Resource Centre.

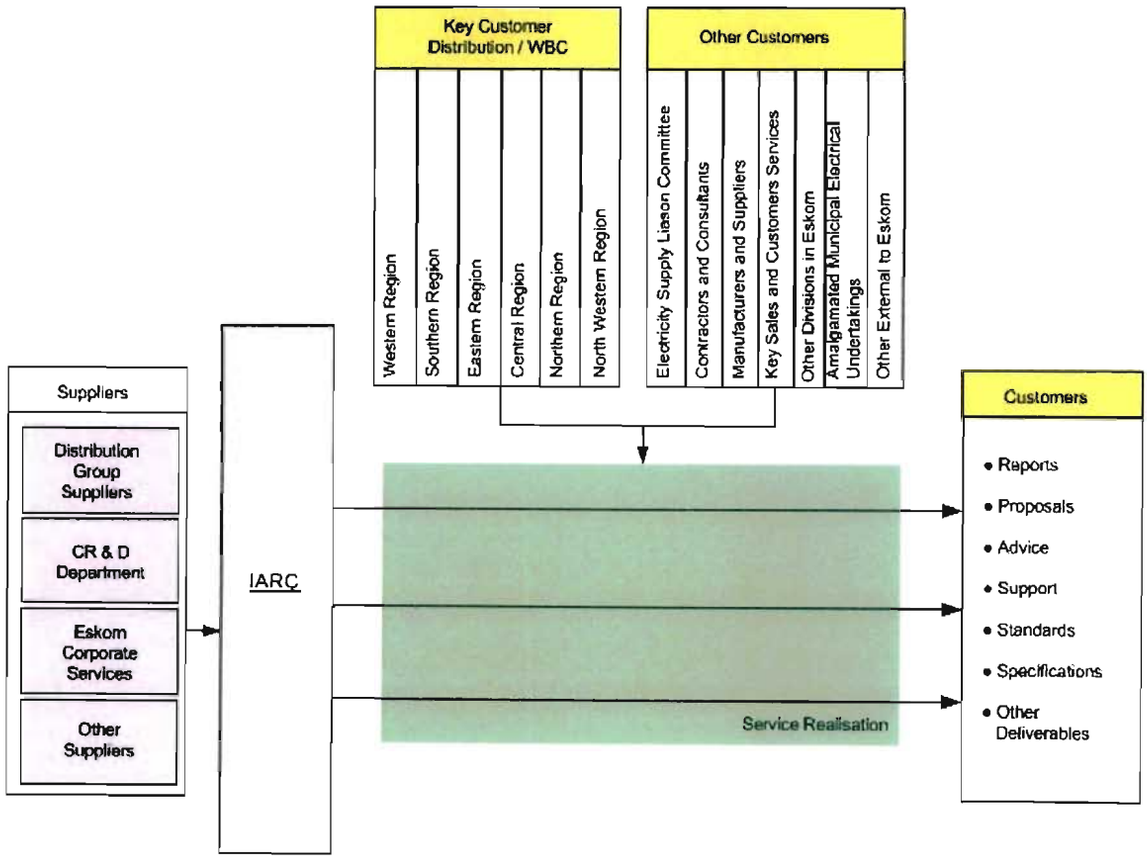


Figure 1-5, List of Customers and Products/Services for the Industry Association Resource Centre

1.3 IMPLEMENTATION STRATEGY

In order to achieve this request, IARC management have created a Steering Committee comprising internal staff members from all sections to drive the implementation process. The Steering Committee have in turn set up a four member task team, to work on this project on a "semi" full time basis. The reason for using the word "semi" is that the team attempts to meet on a Tuesday and Wednesday every week. This however is not always possible as the four members of the group still have to fulfil their normal work functional duties.

My involvement in the implementation process is that of one of the members who comprise the four member task team.

> "*Implementation is best achieved using an internal task force or ISO team.*"
> (Murrakami, R. 1994)

The above is further supported by Kee-hung Lai, C. J. Lau, G. & Cheng, T. C. E., who reference the work group as a "*Quality Implementation Team, (QIT)*" (2001)and Schmitt, G. L., who names her small group of individuals as a "*collaborative*." (2001)

Although the above authors have different names for the task team, they are all in agreement that certification is best achieved with the use of a task team. Therefore the selection of the four member task team for the certification of IARC is sound.

In addition to the appointment of the four member task team an outside consultant with experience in ISO 9001:2000 certification was appointed to be used on an ad-hock basis. The idea behind the appointment of the four member task team and consultant is to try and speed up the certification process.

Hughes, T. Williams, T. & Ryall, P. caution the use of a consultant, mentioning that the consultant should be used from a tactical rather than a strategic perspective. (2000)Lawrence (as cited in Hughes, T. et al,. 2000) found this and warned of its dangers.

He stressed that the consultant should be used as an implementation resource rather than an initiator of change. He further stressed the importance that management must drive change and its philosophical basis.

Murakami. R. supports the services of a consultant and states that they can save an organisation time and money. He however cautions on the selection of an external consultant. (1994)

The consultant chosen by IARC has experience within Eskom as she has worked and is currently working with various Eskom departments. She was further recommended by our quality assurance sub section. Finally she was further interviewed by the four member task team and found to be suitable for the project.

The four member task team as mentioned before are internal employees that are employed by IARC on a full time basis. This team knows the working of IARC and therefore do not need training in the understanding the IARC business plan. The external consultant fully understands the ISO 9001:2000 certification process and therefore provides that expert service.

It must be stressed that the consultant for this implementation process is only used for the understanding of the requirements for ISO 9001:2000 certification. At this point it must be noted that the consultant will have no influence on IARC's change process. This process will rather be initiated by the Management Representative and the IARC Manager who is defined by ISO 9000 as "*Top Management.*"

The four member task team meet on a weekly basis and consult with the consultant on a when as required basis as stated above.

See Figure 1-6, Organisational Structure of the Industry Association Resource Centre.

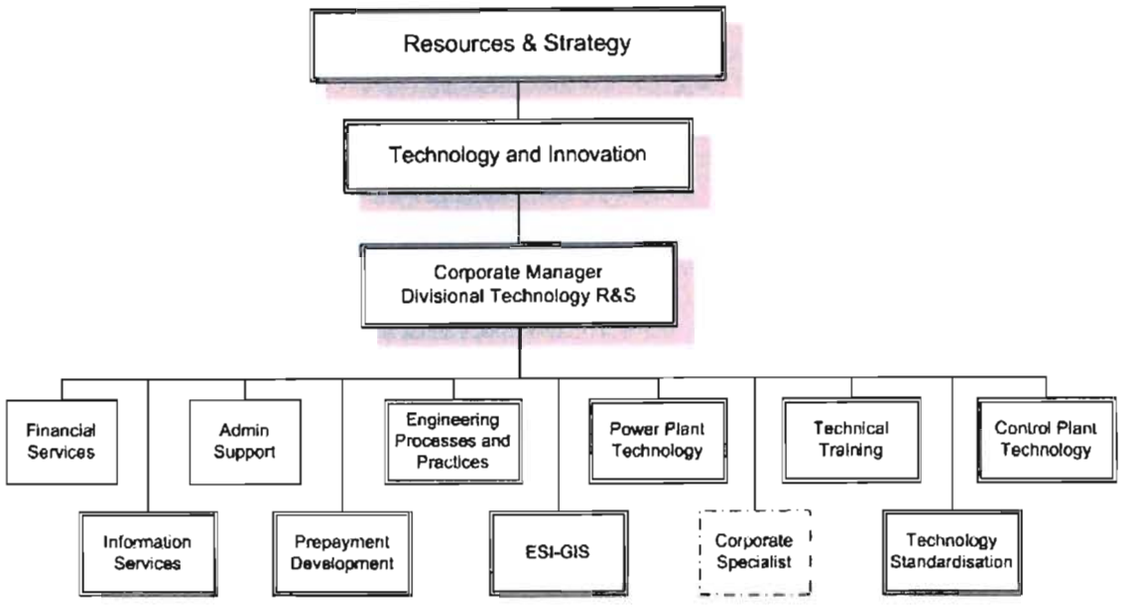


Figure 1-6, Organisational Structure of the Industry Association Resource Centre

As can be seen from above IARC consists of eight sections and also provides a consulting service. This research paper covers the certification of five sections in IARC and not all eight. The reason for this is that three of the sections have already achieved ISO 9001:2000 certification.

The five sections covered by this research paper are;
Technology Development, Power Plant,
Technology Development, Control Plant,
Engineering Processes,
Technical Training and
Pre-Paid Development

1.3.1 Industry Association Resource Centre.

1.3.1.1 Resources & Strategy Vision

The Industry Association Resource Centre will be the leading force in technology development and standardisation in the South African Electricity Distribution Industry and a contributor to the African Electricity Supply Industry

1.3.1.2 Industry Association Resource Centre Mission

To lead, direct and facilitate the collaborative development of standardised technologies, engineering solutions, information and data.

1.3.1.3 Industry Association Resource Centre Values

Technical expertise
Customer satisfaction
Respect for people
Business ethics
Continual improvement

1.3.1.4 Industry Association Resource Centre Policy Statement

The IARC is committed to:
Achieving the highest possible standards of customer satisfaction,
Motivating the use of standardisation in achieving business goals, and
Developing appropriate technologies, designs, engineering processes and skills.
(Industry Association Resource Centre Business Plan 2005 / 2006)

It was deemed necessary to list points 1.2.1 and 1.3.1 in order to help with the positioning of R & S and IARC within the industry.

1.4 PURPOSE STATEMENT

Locke et al,. 1987 (as cited in Cresswell, J.W. 1994) *"the purpose statement should provide a specific and accurate synopsis of the overall purpose of the study."*

1.4.1 Objective

The objective of this study is the development, implementation and certification of ISO 9001:2000 Quality Management System (QMS) within IARC and to ensure that the specified time frame is achieved.

1.4.2 Requirement

It is required that the certification is achieved through an accredited body (registrar) that is a member of an accredited institution. that in turn is a member of the International Accreditation Forum (IAF)

The South African National Accreditation System (SANAS) is one such institution.

> *"SANAS is further recognised by the South African Government as the single National Accreditation Body that gives formal recognition that Laboratories, Certification Bodies, Inspection Bodies, Proficiency Testing Scheme Providers and Good Laboratory Practice (GLP) test facilities are competent to carry out specific tasks. "*
> Retrieved May 03, 2005 from the World Wide Web,
> http://www.sanas.co.za/

There are however a number of SANAS accredited bodies (registrars) within the boundaries of South Africa of which the South African Bureau of Standards Certification (Pty) Ltd is listed as such.
Retrieved June 08, 2005 from the World Wide Web,
http://www.sanas.co.za/directory/cert

In addition to the above, their is another body, the Southern African Association of Certification Bodies (SAACB)
Retrieved May 03, 2005 from the World Wide Web,
http://www.saacb.co.za/members_main.asp.

The accredited bodies (registrars) listed with SAACB are not necessary linked to SANAS but are in turn linked to their own international accrediting institutions, i.e British Standards Institution South Africa (BSI SA) which in turn is linked with United Kingdom Accreditation System, (UKAS) and not (SANAS).

The selection of a registrar is equally as important as the selection of an accredited authority. The registrar should well known to the organisations customers as this will result in the organisations customers having faith in the certification. Achieving certification via a registrar that is not known by the organisations customers could render such an accreditation useless.

> *"The selection of a registrar that is right for your needs is not as easy as it may appear. Not all registrars are created equal. The most important question in the selection process is, Who will be scrutinizing my registration? In most cases, this will be your customers. If you deal exclusively in Canada and/or the US then one of the registrars certified by the Standards Council of Canada is a good bet. Your customers will recognize these registrars without question."*
> (Murrakami, R. 1994)

> "*The selection of a registrar should also have experience in a specific industry.*"
> (Peach, B. Peach, R. W. and Ritter, D. S. 2000)

For the purposes of this research paper it has been decided to achieve certification through a registrar that is Proudly South African and further a member of the South African National Accreditation System (SANAS), hence the selection of SABS Certification (PTY) Ltd.

Over and above the fact that SABS is linked to the IAF via SANAS and is a South African based organisation they have an employee, (Auditor) that specialises in the auditing and certification of Eskom departments. He understands the business and has been involved in a number of previous certifications with Eskom departments. Further he was once an employee of Eskom.

At this point it is important to state that the three newly incorporated sections have also achieved certification through SABS Certification (PTY) Ltd. All three were totally satisfied with the service and accreditation by SABS Certification (PTY) Ltd.

Based on the above it can be seen that the selection of SABS as the certifying body (registrar) is the optimum choice. Further all of IARC's customers reside within the Republic of South Africa and thus all know SABS as the majority of them would have made use of SABS for testing purposes.

The International Accreditation Forum, South African National Accreditation System, South African Association of Certified Bodies and South African Bureau of Standards Certification (Pty) Ltd will be discussed in detail under Chapter 2 Literature Review, Section 2 Accredited Bodies.

As the three new sections that have been recently incorporated into IARC are currently ISO 9001:2000 certified they do not form part of this research paper, they are;

Information Centre,
Standardisation and
Electricity Supply Industry-Geographic Information Systems (ESI-GIS)

As stated above the boundaries for this research paper are very clear. See Figure 1-7, System Map of the Industry Association Resource Centre for this research paper.

The Systems Map identifies all eight of the sections within IARC but separates the five that have still to achieve certification. All of IARC's Customers and Suppliers are shown in the external environment. It is only the R & S Division that exists in all three environments. The reason being that they can be considered to be a stake holder / customer of IARC's and IARC forms part of them.

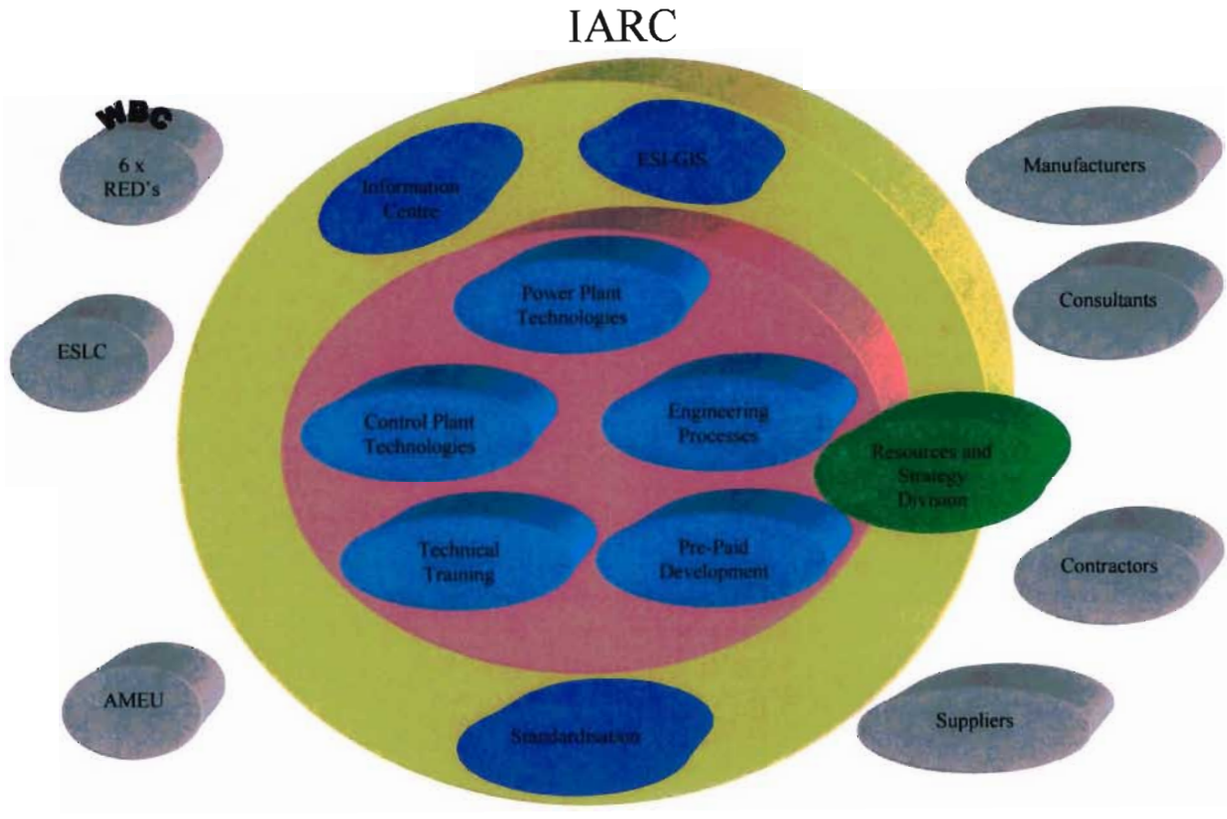


Figure 1-7, System Map of the Industry Association Resource Centre for this research paper

1.4.3 Dissertation title

The title of this dissertation based on the above objective and requirement is thus;

THE DEVELOPMENT, IMPLEMENTATION AND CERTIFICATION OF SANS ISO 9001:2000 WITHIN FIVE OF THE SECTIONS OF THE INDUSTRY ASSOCIATION RESOURCE CENTRE (IARC).

1.4.4 Previous research undertaken

In order to place this dissertation in the context of the research completed and currently in progress in South Africa, a review of the South African research database, NEXUS was conducted in August 2005. Key words used in the search were ***ISO***, ***develop*** and ***implement***. When the use of an additional key word of ***2000*** was introduced their were no results displayed.

For the results of this search see Table 1-1, results of NEXUS database research

Table 1-1, results of NEXUS database research

Title	Author	Completed
An evaluation of the implementation of International Standard Organisation (ISO) Guide 25non quality service for external and internal customers of Ampath: a case study.	Ntsimane. L.	2002
An assessment of environmental management in South African Industry	Dildar. M.	1999
Translated Title: The implications of ISO 14001 for the South African mining sector	Prinsloo. H.B.	2000
Development of a software quality assurance system for the software engineering applications laboratory	Jager. M.M.	1996
A water quality management system framework for the East Rand Gold and Uranium Company	Oosthuizen. E.M.	1997
Evaluation of the environmental impact management control for linear development with reference to ISO14001	Geeringh. J.H.	1998
Integration of an environmental management system (ISO14001) in small/medium national parks Database: Current & Completed Research	Bancroft. C.M.	1998
Translated Title: The integration of the stipulations of Responsible Care, NOSA and ISO into a management system for the chemical industry	Cloete. J.H.	1999
A water quality management system framework for the East Rand Gold and uranium company	Oosthuizen. E.M.	1997

Based on the above it can be seen that the scope of the work required for this research paper has not been previously undertaken within South Africa.

While pondering how to place the ISO processes into context, how they then in turn fit in with the IARC processes and how this then finally influences Mr General Public.

I was watching an interview with Hendry "Blowers" Blofeld on the television during the lunch break in one of the *ASHES TESTS* that was recently played in England.. "Blowers" as he is affectionately known by his peers is a well known British radio commentator, with his speciality being cricket. In the interview was asked this question,

"*Why is it that you always talk about the busses driving around the stadium, aeroplanes flying over, weather conditions, etc?*" His answer went something like this. "*Well as you know I am commentating on the radio and the listeners can hear my voice but cannot see anything. In order for them to appreciate the game, I have to place them in the stadium to ensure that they fully understand the surroundings.*" He further went on to say that he always tries to paint a picture for the listeners and then attempts to frame it.

I can see two systems approaches that he is using above. Firstly he places the cricket match within a context and then clearly identifies the boundaries. I will now attempt to do the same but by taking the ISO and IARC processes into account and how they in turn affect Mr General Public.

The week starts early Monday morning with the alarm waking you from your slumber, more often than not the radio is your alarm and you then awaken to either music playing or some person trying to get you out of bed. The next step is to get out of bed and progress to the kitchen where all types of electrical appliances are turned on, kettle, micro- wave, toaster etc. Next you would like a shower and by some miracle the water is hot. Ever thought about what we would do without electricity. Never, does not cross your mind does it. "*How can we live without our tea or coffee in the morning and a nice hot shower*?" we ask our selves.

Ever thought of where the comforts of electricity come from? No why? Well I am now going to put it into perspective and show how ISO fits into the IARC processes.

Electricity is generated by Power Stations which can be, coal fired, hydro powered, nuclear powered etc (Generation). This in turn is then stepped up to an appropriate voltage, ie 275, 400 or 765kV etc (Transmission) for transmitting the electricity. This electricity is then stepped down to 132, 88 or 66kV etc (Distribution). This is where IARC gets involved with the distribution of the electricity.

Their are numerous substations around the country that will then in turn step the voltage down to a lower voltage, 33, 22 or 11kV etc. This voltage in turn is then stepped down to a 400v 3 phase supply which is then sold to domestic dwellings as a 230v single phase supply. This is the supply that is responsible for getting you up in the morning.

The above is a very high level and brief explanation of where electricity comes from. See Figure 1-8, electricity creation chain

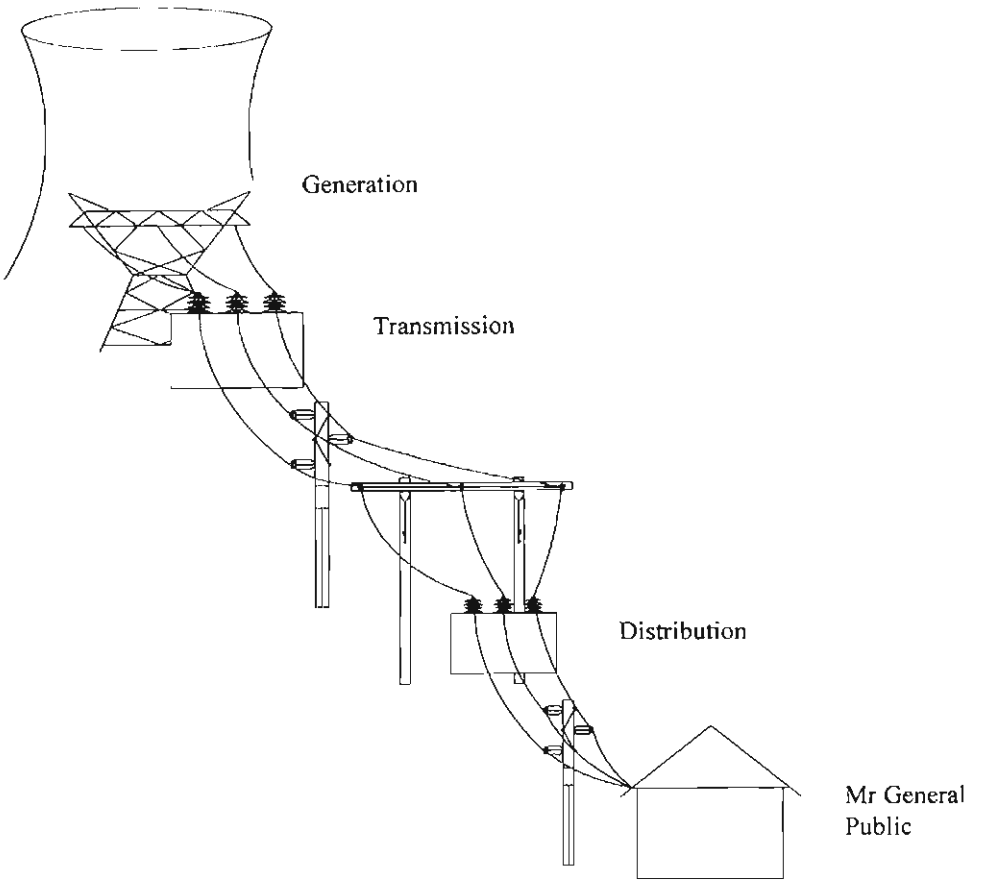


Figure 1-8, electricity creation chain

Now how does the above fit in with ISO and the processes within IARC?

Forgetting about Generation and Transmission I will concentrate on the distribution of electricity. Ever thought of the following questions when you see substations, power lines, cables etc

- How do they get built?
- What equipment is used?
- Why here and not there?

These are but a few questions that are asked.

All the above has to be designed and specified by somebody, these include what you see in the country side; to the switch in you house that lights up the darkness; socket outlets that you plug your appliances into that wake you up in the morning etc. Each item needs to be built and tested to a certain specification. This does not just happen, there is a **process** to be followed and this **process** happens within IARC.

In the context of my work the processes that require quality management are all work done by IARC. Work is the product and or services identified in Figure 1-5, List of Customers and Products/Services for the Industry Association Resource Centre.

As can be seen from above IARC is the business of providing products and or services that affect the entire country in different ways. Each product or service has to go through a process internal to IARC. This process has to be as fault free as possible in order to ensure that our customers receive optimum products or services.

Failure to comply with the above can lead to extended electricity outages which in turn has a direct link to the quality of life for Mr General Public and can eventually have a negative effect on the economy as a whole. This can be caused by a specification that is inadequately written and items then purchased against the same specification. See Figure 1-9, multiple cause diagram for quality of products

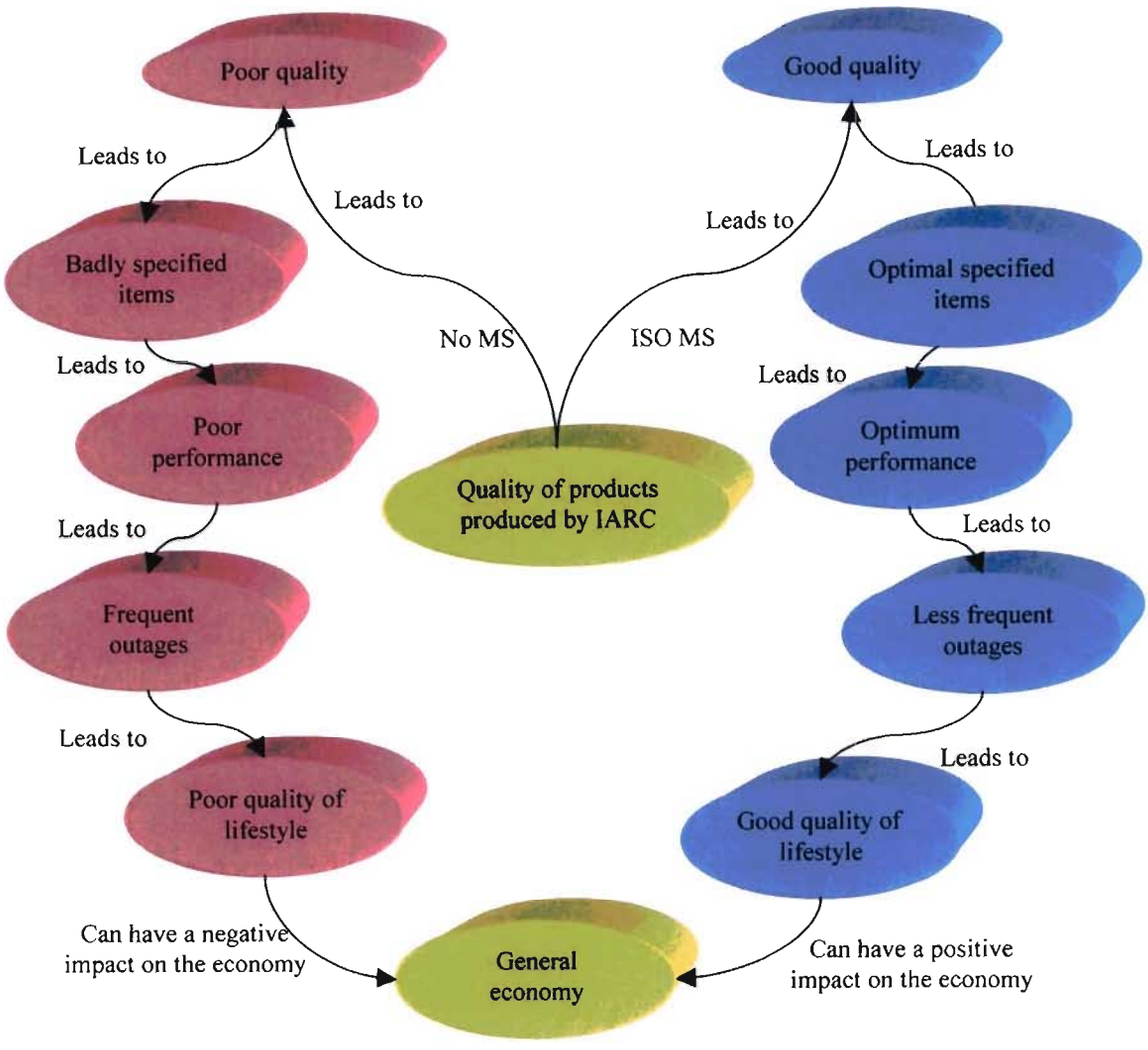


Figure 1-9, multiple cause diagram for quality of products

1.5 BENEFITS OF ACHIEVING ISO 9001: 2000 CERTIFICATION

The benefits of achieving ISO 9001:2000 certification or any other systems certification is however not fully supported throughout. Powell (as cited in Love, P. E. D. Smith, J. Treloar, G. J. and Li, H. 2000.) is of the opinion that quality programmes can generate significant costs without observable gains.

Landin, A. and Nilsson, C.H. ask the question as to whether the implementation of quality systems really make a difference. They further state that success stories are reported on and not failures which in turn skew the results towards an optimistic point of view. (2001)

I do however believe that the above statements are in the minority and the benefits of implementing ISO 9001:2000 far outweigh the negatives. This will be discussed in detail in Chapter 2 Literature Review, Section 4 Implementing ISO 9001:2000.

The ISO 9000 family of Quality Management System's (QMS) series works on a systems and process approach whereby continuous improvement is built into the process. Systems approach implies that all activities are interlinked (implying that relationships exist between them) and that they are not in isolation to one another. Each activity is affected by the other. With the process approach one activities output is the next activities input.

ISO 9001:2000 certification is the first phase in the process of implementing a quality management system for any organisation. The process is such that it keeps challenging the organisation to continually improve on their present system.

Peach, B. et al,. suggest that that complying with ISO 9001 does ***not*** indicate that every product or service complies with the customers requirements, only that the quality system in use is ***capable*** of meeting them. They further state that an organisation must continuously ***asses*** customer satisfaction and constantly improve on the processes that produce the products or service. (2000)

Continuous improvement through the implementation of Total Quality Management (TQM) further ensures customer satisfaction in that the organisation questions the process continually. It further involves top management's commitment to achieving continual excellence. This ensures that motivation, awareness, and involvement through the staff members are always maintained. It further ensures the availability of resources be it human, technology or infrastructure etc.

Other benefits through the role of top management are;

- Promotes the quality policy and quality objectives throughout the organization to increase awareness, motivation and involvement,
- Establishes and maintains the quality policy and quality objectives of the organisation,
- Ensures the availability of resources and
- Reviews the quality management system periodically

The above are but a few examples of benefits that can be achieved, as stated in ISO 9000:2000.

1.6 STRUCTURE OF THE DISSERTATION

The dissertation will be constructed according to five chapters. See Figure 1-10, Spray Diagram of the research paper

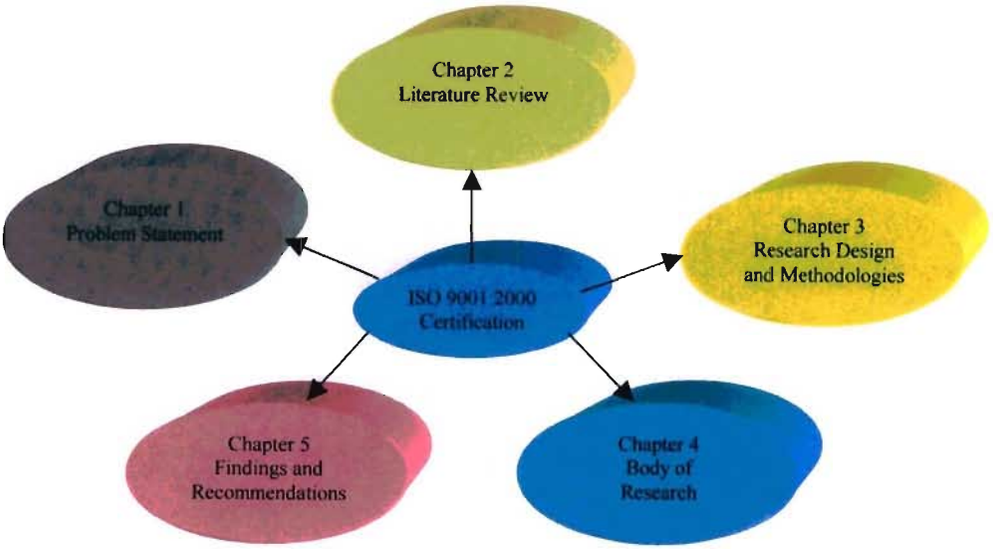


Figure 1-10, Spray Diagram of the research paper

Chapter 1, **Introduction,** outlines the entire project in brief and will be constructed according to six sections, Introduction, Problem Statement, Implementation Strategy, Purpose Statement, Structure of Dissertation and finally Conclusion.

Chapter 2, **Literature Review,** will be structured into nine sections; Introduction, Accredited Bodies, ISO Quality Management System specifically ISO 9000:2000 family, Implementing ISO 9001:2000, Total Quality Management, Change Management, Organisation Culture, Decision Making and Conclusion.

The second and third sections will be concentrated on understanding the various accreditation and certification bodies and then finally the ISO 9000 family QMS will be discussed. The next five sections will concentrate on the implementation process.

Accredited Bodies looks into the world wide structure of such bodies and traces back how SABS is linked to SANAS and how in turn SANAS is linked to the IAF Inc. The Multi Lateral Agreement (MLA) is discussed to see how this affects all the IAF's peers. A direct link between the IAF and World Trade Organisation (WTO) is realised in order to help eliminate trade barriers. The importance of an organisation such as the International Organization for Standardization (ISO) is discussed and what benefits it offers to world trade. Standardisation is taken for granted by many that do not realise the benefits that such a process offers. ISO 9001:2000 certification is the first phase in customer satisfaction, only once the system is in place can it be bettered. Standardised processes do help organisations especially where high staff turn over is the norm. ISO 9001:2000 certification plays an important role in an organisations future. It appears that there is no standardised implementation process. Each organisation learns about the process as they implement it.

Total Quality Management (TQM) stresses the importance of introducing and maintaining continuous improvement, "*KAIZEN*" a Japanese (word for incremental quality improvement) within the organisation and the benefits that can be achieved by Implementing TQM. TQM is arguably the most significant of the new ideas that have swept across operations management. This is mainly due to two reasons, most of us want to be achieving high quality and improvement can often lead to increases in operational effectiveness.

Change Management discusses the importance of change within an organisation, for an organisation to remain competitive today in a world global market; change has to be accepted positively and enthusiastically by all through out the organisation. The rate at which an organisation can successfully and continuously implement change within itself and to thereby pass on all its improvements to its customers is a definite advantage. Organisations of the future need to become learning organisations and must realise that when you learn you change.

Each organisation is dependant on the culture instilled within itself hence the importance of creating a Quality Culture within the organisation. Culture modification is not on the resources themselves eg a single person, but on how all the staff are interlinked (relationships) and mobilised. A good example of this is that a chain is only as strong as its weakest link.

The second last section covered in this chapter will focus on Decision-Making - how does one make a decision is very important to the success of the project. Decisions are not only about the success of projects but of the organisation as a whole. The important fact about Decision Making is to try and ensure that you scan the facts that are available and thereby reduce the uncertainties. The more information and facts that one has at his / her disposal will help in the correct decision being made. Lastly but definitely not least is that decisions need to be based on facts.

Chapter 3, **Research methodology and design,** will be structured into six sections; Introduction, Research Methodology, Research Design, Data Collection, Data Analysis and Interpretation and finally the conclusion.

This information will be considered to be the primary data and the information researched in chapter 2 will be the secondary data. Before any problem can be analysed it is important for one to understand the process and to determine the correct strategy to follow.

The Research Methodology followed for this research paper was that of mixed methods, using both the *Qualitative* and *Quantitative* designs. The reason for adopting both designs was the fact that both the harder and softer issues had to be addressed. The strategy followed was based on *Action Research* as the research was conducted during the design and implementation phase. This phase was done by a work group of four people that were considered as co-researchers.

The Research Design phase was based on a Gap Analysis (*Quantitative, hard information*) and the conducting of interviews (*Qualitative, softer information*) with people both internal to and external to the Industry Association Resource Centre.

The Data Collection phase describes the methods used for the data collection. Three methods were employed; observation, Gap Analysis and Interviews.

Data Analysis and Interpretation, once all the information has been collected it then needs to be analysed and interpreted. This was achieved by analysing the Gap Analysis, Interviews and by the Literature Review.

Chapter 4, **Body of Knowledge**, will be structured into five sections; Introduction, Literature Review, Gap Analysis, Interviews and Conclusion.

ISO appears to be universally accepted standard that has a structure in place which is further linked to the International Accreditation Forum Inc. Their however is no generally accepted implementation process laid out. ISO 9001:2000 certification is the first phase in the Quality Management System the real benefits come with the implementation of quality management. Change management, corporate culture and Decision making were also analysed. An interesting observation found is the general misunderstanding of the Japanese Quality Management System.

Due to the fact that the Industry Association Resource Centre had implemented the TESCOD process years ago the gaps found between the existing system and the requirements of ISO did not cause major problems.

The interviews also hi-lighted the fact that no formal implementation process exists for ISO 9001:2000 certification. A further fact that was identified is the opinion that all registrars are not deemed to be equal.

Chapter 5, **Findings and Recommendations**, will be structured into four sections; Introduction, Findings, Recommendations and Conclusion.

The importance of a fourth dimension "*Utility*" was discussed over and above the three normal dimensions of a project namely; "*Time, Cost and Quality.*"

Due to the fact that no universally accepted ISO 9001:2000 certification implementation process exists a new process is recommended. The recommended process consists of four stages and is based on the IARC existing process. The major changes occurring in the first two stages where activities were repositioned, redefined, redefined and repositioned and finally a new activity was added.

1.7 CONCLUSION

A new implementation process for the certification of ISO 9001:2000 is recommended and as a result this research paper will be based on this approach. Certified bodies are investigated, the ISO 9000 family is investigated and costs and benefits associated with the certification process are investigated. Finally a preferred implementation strategy is investigated. All areas of responsibility will have to be clearly defined with clear boundaries so as to reduce and to finally eliminate all the grey areas, furthermore the quality and type of information that is to be made available at the various stages in the process should be of a standard that will assist in the decision making process. This research paper further looks at the need of understanding corporate culture, making change work and finally building Total Quality Management into process. The research is based on the knowledge that is available to the author at this point in time.

Chapter 2

LITERATURE REVIEW

2.1 INTRODUCTION

The literature review for this research paper is based on seven areas:

- Accredited Bodies,
- ISO Quality Management Systems specifically 9000:2000 series,
- Implementing ISO 9001:2000,
- Total Quality Management ,
- Change Management,
- Organisational Culture and
- Decision Making.

The reasoning for the selection of the above areas is covered under 2.1.1.through to 2.1.7

The chapter will be constructed according to nine sections. See Figure 2-1, Spray Diagram for the Chapter

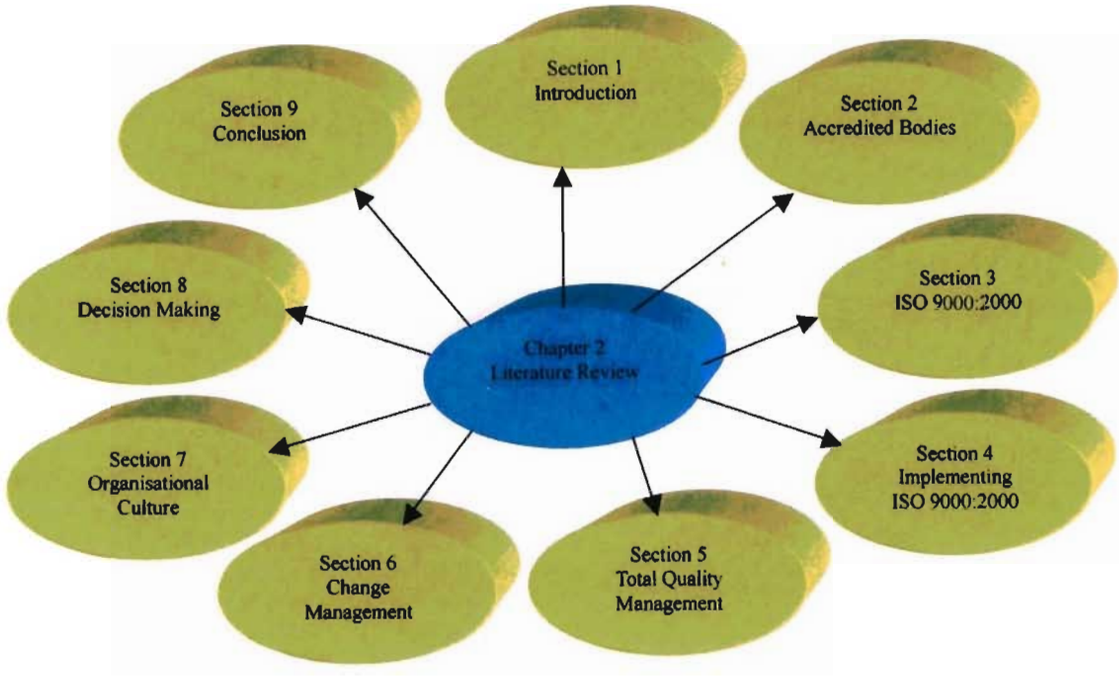


Figure 2-1, Spray Diagram for the Chapter

2.1.1 Accredited Bodies

It is of the utmost importance that IARC achieve its certification through an internationally accepted certification body that is fully recognised and accepted by IARC's customers.

2.1.2 Quality Management Systems (ISO 9001: 2000)

To ensure the optimum implementation of ISO 9001: 2000, it is important that the ISO family is fully understood.

2.1.3 Implementing ISO 9001:2000

A study will be conducted on other organisations that have implemented quality management systems specifically ISO 9001:2000.

2.1.4 Total Quality Management

"KAIZEN", continuous improvement "to be defined in section 2.5", continuously looks into bettering the existing process within the organisation.

2.1.5 Change Management

The question is continuously asked, why change? Leave the organisation as is, "Don't rock the boat." The quicker an organisation can adapt to and implement change within will result in sustained competitive advantage.

2.1.6 Organisational Culture

For change within an organisation, "in this instance, the successful implementation of ISO 9001:2000" to be successful the culture and attitude of the entire organisation as such needs to be flexible and positive.

2.1.7 Decision-Making

The importance of making the correct decision at the right time can prove to be critical to the success of the project.

2.2 ACCREDITED BODIES

2.2.1 International Accreditation Forum (IAF)

IAF - Certified once, accepted everywhere

Retrieved June 10, 2005 from the World Wide Web,
http://www.iaf.nu/

2.2.1.1 History of the IAF

"The International Accreditation Forum was formed in January 1993 following interest from a number of regional and national accreditation bodies."

(Owen, J 2005)

Membership growth of the IAF can be seen listed below as quoted in the minutes of the first four meetings.

- The first meeting was attended by 10 Attendees from 7 Countries with 6 Observers representing various accreditation bodies. It was further chaired by Reuben Autery, Chairman, Board Committee for Conformity Assessment, American National Standards Institute(ANSI), USA.
- The second meeting was attended by 14 attendees from 10 Countries with 6 Observers.
- The third meeting was attended by 22 Attendees from 14 Countries with 8 Observers. ISO delegates were in attendance.
- The fourth meeting was attended by 27 Attendees from 16 Countries with 5 Observers. This was the first meeting that South Africa attended.

As can be seen from the above the IAF has shown a positive member growth rate over the years to its present numbers as can be seen in section **2.2.1.4 members**.

> *"ISO 9000 is a means to assure that a product or service meets agreed to requirements."*
> Minutes January 28 1993.

2.2.1.2 Who is the IAF?

> *"The International Accreditation Forum, inc (IAF) is the world association of Conformity Assessment Accreditation Bodies and their bodies interested in conformity assessment in the fields of management systems, products, services, personnel and other similar programmes of conformity assessment. Its primary function is to develop a single world wide program of conformity assessment which reduces the risk for business and its customers by assuring them that accredited certificates may be relied upon. Accreditation assures users of competence and impartiality of the body accredited. IAF members accredit certification or registration bodies that issue certificates attesting that an organisation's management, products or personnel comply with a specified standard (called conformity assessment)."*
> Retrieved June 06, 2005 from the World Wide Web,
> http://www.compad.com.au/cms/iaf/public/13

"How does this statement affect the IARC?"
I see it affecting IARC twofold;

- Firstly as an organisation that has multiple and diverse customers, these customers can be rest assured that the quality of product and or service produced by IARC will be of the same high standard for each of them and on a continual basis.
- Secondly as an organisation that acquires goods from all around the world on our customer's behalf it will give us confidence in our suppliers ability to pass on quality products.

2.2.1.3 Role of the IAF

"The primary purpose of the IAF is two-fold:

- *To ensure that it's accreditation body members only accredit bodies that are competent to do the work they undertake and are not subject to conflicts of interest.*
- *The second purpose of the IAF is to establish mutual recognition arrangements, known as Multilateral Recognition Arrangements (MLA), between it's accreditation body members which reduces risk to business and it's customers by ensuring that an accredited certificate may be relied upon wherever in the world. The MLA contributes to the freedom of world trade by eliminating technical barriers to trade. IAF works to find the most effective way of achieving a single system that will allow companies with an accredited conformity assessment certificate in one part of the world, to have that certificate recognised else where in the world. The objective of the MLA is that it will cover all accreditation bodies in all countries in the world, thus eliminating the need for suppliers of products or services to be certified in each country where they sell their products or services. Certified once – accepted everywhere."*

Retrieved June 06, 2005 from the World Wide Web,
http://www.compad.com.au/cms/iaf/public/14

The IAF through all its member bodies sets the world trend in certification and ensures that the "Playing Fields" are levelled.

Firstly the IAF want to ensure that their members only accredit competent registrars, i.e. SABS. Example, SANAS is an Accreditation Body Member, (Peer Evaluator) of the IAF. As a member of the IAF, SANAS has the responsibility of accrediting certifying bodies linked to them within South Africa.

Before the SANAS accredits SABS or any other body SANAS have to be sure that their members are qualified to certify organisations and do not have a conflict of interest. Example you can not have the same section helping an organisation to achieve certification and then that same section actually certifies the organisation. This also does not only apply to the same section with in an organisation but throughout that same organisation.

Secondly the IAF through the Multilateral Recognition Arrangement (MLA) that exists between its members ensures business and its customers that the IAF accreditation system through out the world is on an even par. Example, whether an organisation is certified in South Africa through a SANAS accredited member or an organisation is certified in the United Kingdom through a UKAS accredited member, the certification is deemed to be equal.

This eliminates the need for an organisation to be certified again and again in each and every country that an organisation deals with, hence the IAF's slogan "*Certified once – accepted everywhere*", International Accreditation Forum Inc.

2.2.1.4 Members of the IAF

The IAF has an official IAF MEMBER LIST which is in accordance with article II Section 4 of the Bylaws.

Organisations are listed by:

- Accreditation Body Members, "45 members"
- Associate Members, "13 members"
- Special Recognition Regional Groups, "4 groups"
- Partner Members, "2 members"

Retrieved June 06, 2005 from the World Wide Web, http://www.compad.com.au/cms/iaf/articles/145

Note, SANAS is an Accreditation Body Member of the IAF.

2.2.2 South African National Accreditation System (SANAS)

Retrieved June 10, 2005 from the World Wide Web,
http://www.sanas.co.za/

2.2.2.1 Mission statement of SANAS

"SANAS' mission is to create an impartial and transparent mechanism for organisations to independently demonstrate their competence and facilitate the beneficial exchange of goods, services and knowledge and to provide a service that is recognised as equitable to best international practice while reflecting the demographics of South Africa. SANAS provides laboratory, personnel and certification body in South Africa as well as mutual recognition agreements with international accreditation organisations."

Retrieved June 08, 2005 from the World Wide Web,
http://www.dti.gov.za/thedti/sanas.htm

2.2.2.2 Who is SANAS?

"SANAS is the National Accreditation Body for South Africa, and this is recognised by government through the Department of Trade and Industry, a legal and binding memorandum of Agreement to this effect having been signed in December 1997."

Retrieved June 08, 2005 from the World Wide Web,
http://www.dti.gov.za/thedti/sanas.htm

As stated previously in chapter 1 SANAS is the single National Accreditation Body that gives formal recognition which is recognised by the South African Government. SANAS is further the only South African body that is one of the Accreditation Body members of the IAF

What does such a statement imply?

This implies that SANAS is the only body in South Africa that can accredit an organisation that would like to issue ISO certification which complies with the International Accreditation Forum, (IAF). This however does not imply that only SANAS registered bodies can issue ISO certification within the borders of South Africa. Other certification bodies will be discussed under Southern African Association of Certification Bodies.

> *"Organisations accredited by SANAS becomes a stakeholder in SANAS and are therefore entitled to use the appropriate SANAS logo on the certificates that they issue."*
>
> Retrieved May 03, 2005 from the World Wide Web,
> http://www.sanas.co.za/accreditation_why.php

2.2.2.3 Role of SANAS

> *"SANAS is responsible for the accreditation of Certification bodies to ISO/IEC Guide 62, 65 and 66 (and the IAF interpretation thereof), and laboratories (testing and calibration) to ISO/IEC 17025. Inspection bodies are accredited to ISO/IEC 17020 standards. Good Laboratory Practice facilities are inspected for compliance to OECD GLP principles."*
>
> Retrieved May 03, 2005 from the World Wide Web,
> http://www.sanas.co.za/

The full list with the definitions for the above guide numbers is available on the under mentioned website address.

Retrieved May 03, 2005 from the World Wide Web,
http://www.sanas.co.za/accredtation_documents.php

As with the IAF who is responsible internationally for the accreditation of bodies. SANAS is the IAF's counterpart but on a national level. With in South Africa. SANAS further conforms with all the requirements as stipulated by the IAF and through an arrangement known as the MLA which reduces the risk to businesses and their customers.

2.2.2.4 Members of SANAS

SANAS currently have 17 members linked to their body. The full list of members can be seen on the below mentioned web site. These members have different accreditation criteria for different scopes of accreditation. The different scopes are mentioned under 2.3.1.3 Roles of SANAS.

Note, SABS Certification (PTY) Ltd is one such member, it further holds three different accreditation criteria namely:

- ISO/IEC Guide 62 for Quality Management Systems (QMS).
- ISO/IEC Guide 66:1996 for Environmental Management Systems (EMS).
- ISO/IEC Guide 65 for Product certification.

The Guide that is of interest to IARC is Guide 62, this falls under the scope of accreditation for;

QMS Certification including (HACCP), ISO 9001:2000. This guarantees that the certification issued by SABS is certified by SANAS which in turn will finally be honoured by the IAF. This verifies the fact that IARC can go ahead and appoint SABS as the certifying body.

Retrieved June 08, 2005 from the World Wide Web,
http://www.saacb.co.za/members_main.asp

2.2.3 Southern African Association of Certified Bodies (SAACB)

Retrieved June 10, 2005 from the World Wide Web,
http://www.saacb.co.za

2.2.3.1 History of the SAACB

SAACB was founded during May 1998 and had nine founder members it is based in South Africa and is further registered as section 21 organisation.

Retrieved May 03, 2005 from the World Wide Web,
http://www.saacb.co.za/about_saacb_main.htm

2.2.3.2 Who is the SAACB?

> *"The SAACB is a non-profit making organisation concerned with the promotion of accredited certification. Membership consists of companies and institutions involved with certification and/or registration of quality Management Systems, Environmental Management Systems, Products, Personnel and Safety Management Systems. This certification is available tp organisations to provide continuing independent assurance that their goods, services, processes or personnel conform to specific standards or requirements, which are recognised nationally and internationally."*
>
> Retrieved May 03, 2005 from the World Wide Web,
> http://www.saacb.co.za/code-of_conduct_main.htm

2.2.3.3 Role of the SAACB

The SAACB has a number of members linked to the association. All members have direct links back to the IAF through their own accreditation bodies. SAACB do not only allow members linked to SANAS to join SAACB but also allow members linked to other accredited bodies to join. Their main objective is the certification of various management systems for organisations within South Africa.

All members have to act in an ethical manner.

"Members shall;

- *Uphold the high standards of accredited certificates.*
- *Undertake only work, which they are competent to perform.*
- *Take responsibility for their work.*
- *Avoid any conflict of interest between themselves, their clients and those concerned with the ultimate use of goods or services applied.*
- *Not misrepresent the certification service they provide, or the status of the bodies they have certified.*
- *Not permit any publication written or oral, to give the impression that certification and consultancy are linked.*
- *Act professionally and with fairness.*
- *Assure adequate cover against the risk of liability"*

Retrieved May 03, 2005 from the World Wide Web,
http://www.saacb.co.za/code-of_conduct_main.htm

2.2.3.4 Members of the SAACB

The SAACB currently have 14 members linked to their association. The full list of members can be seen on the below mentioned web site.

Retrieved May 03, 2005 from the World Wide Web,
http://www.saacb.co.za/members_main.asp

The difference between the SAACB and SANAS is that SANAS is an accreditation body that is linked to the IAF as an registrar. SAACB however is a body of accredited certifiers but may not accredit certifiers. They further do not have a direct link back to the IAF or SANAS.

2.2.4 SABS Certification (Pty) Ltd.

SABS
CERTIFICATION (Pty) Ltd

Retrieved August 5, 2005 from the World Wide Web
http://certification.sabs.co.za

2.2.4.1 Introduction

The South African Bureau of Standards (SABS) is a Government owned enterprise that consists of two divisions, namely the Core division and Commercial division.

The Core division is responsible for all the statutory departments, ie Standards South Africa (STANSA). STANSA in turn develops, issues and provides information on standards in all areas of technology. These are split into five departments;

- Chemical and Biological Standards,
- Electrotechnical Standards,
- Fibre Technology Standards,
- Mechanical, Transportation and Civil Standards and
- System Standards.

SABS Certification (Pty) Ltd falls under the commercial leg of SABS. It is a services sector that is dedicated to auditing service organisations against ISO 9000 requirements.

2.2.4.2 SABS Certification specialist skills

- Teams that are dedicated to auditing Manufacturing and Service organisations against ISO 9000. Members of the teams are committed abd share a vision of improving service and manufacturing quality levels in Southern Africa
- Experienced in auditing ISO 9000.
- Auditors take ownership of clients ensuring customer satisfaction and confidentiality of client information.

- Auditors are loyal to their clients because they are permanent employees and not consultants.
- Branches country wide which leads to cost savings for clients.
- Have a wide variety of expertise which makes it possible to assign audit teams with precisely the required technical expertise.
- Planning and skills are controlled by an extensive database- providing information at the clients fingertips.

Retrieved August 17, 2005 from the World Wide Web
http://certification.sabs.co.za/sc/SC9000.HTM

2.2.5 Conclusion

Thus in conclusion one can see a clear reporting structure for Accrediting and Certifying Bodies for the implementation and certifying of Quality Management Systems, "ISO 9001:2000" throughout the world. See Figure 2-2,International Accreditation Forum reporting Structure with its Peer Evaluators i.e. "South African National Accreditation System, United Kingdom Accreditation System etc" with their Certifying Bodies i.e. "South African Bureau of Standards, British Standards Institute etc."

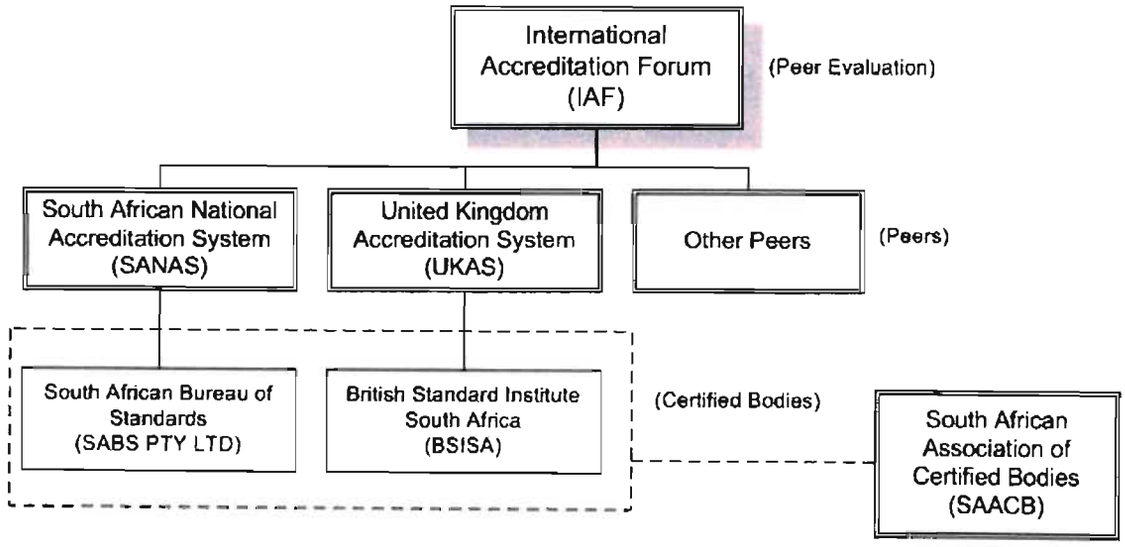


Figure 2-2,International Accreditation Forum reporting Structure

The South African Association of Accredited Bodies is shown in figure 7 for information purposes only. This body is a conglomeration of certified bodies within South Africa but has no direct reporting structure back to the International Accreditation Forum. All the member bodies have formal reporting back through their national Accreditation Systems.

The importance of an organisation such as the International Accreditation Forum can not be over emphasised. This can be seen from the data as analysed above.

2.3 ISO QUALITY MANAGEMENT SYSTEMS SPECIFICALLY 9000:2000 SERIES.

Retrieved June 14, 2005 from the World Wide Web, http://www.iso.org/iso/en/ISOOnline.frontpage

2.3.1 History of the ISO

After a meeting in London during 1946 that was attended by 25 countries, the new organisation which is now known as ISO was created. ISO officially began operations on the 23 February 1947. This was after organisations such as the International Electrotechnical Commission, (IEC) which was established in 1906 and the International Federation of the National Standardizing Associations, (ISA) which was established in 1926. The latter came to an end in 1942.

"Where did the name ISO come from?" As the International Organisation for Standardisation is a world wide organisation and would have different abbreviations for different languages, eg *"IOS"* for English and *"OIN"* in French, "Organisation internationale de normalisation", it was decided fro the beginning to use the Greek word "isos" meaning *"equal"*. This allows for one abbreviation no matter what country one is in or what language one speaks.

2.3.2 Who is the ISO?

Between 1947 and the present day ISO has published more than 15000 International Standards. These standards range from the more traditional activities such as agriculture and construction through mechanical construction to medical services etc.

> *"ISO (the International Organisation for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electro-technical Commission (IEC) on all matters of electro-technical standardization."*
>
> SABS ISO 9000 2000

The developers and maintainers of ISO 9000 series are ISO Technical Committee 176, (TC 176). ISO reviews and amends all its standards on a five year basis.

ISO is a non-governmental organisation that is funded by its members that meet the operational cost of ISO's Central Secretariat. Each member is charged a fee that is proportional to the countries Gross National Income and trade figures. It is further funded by the sale of standards, The Central Secretariat however constitutes approximately one fifth of the operational costs. The main costs are from the members travelling costs and allowing them time to work on the standards.

> *"ISO is a network of the national standards institutes of 151 countries, on the basis of one member per country, with a Central Secretariat in Geneva, Switzerland that coordinates the system."*
>
> Retrieved June 14, 2005 from the World Wide Web,
> http://www.iso.org/iso/en/ISOOnline.frontpage

ISO is able to act as a bridging organisation in which consensus can be achieved on solutions that meet both the requirements of business and the broader needs of society. This is due to the fact that ISO is a non-governmental organisation, its members however are not.

ISO is further one of the few non-governmental organisations that have an observer status on the World Trade Order, (WTO). Its contribution is foremost in the elimination of trade barriers.

Finally ISO is managed by its members who meet twice a year for a general assembly. Proposals are put to the members that develop them through the ISO council drawn from the membership as a whole. This council also meets twice a year and its members are rotated to ensure that it is representative of its members. Operations are managed by a Secretary-General who is a permanent appointment that reports to the council. The secretary-General is based at ISO Central Secretariat in Geneva, Switzerland, with a compact staff which provides administrative and technical support to the ISO members. The council is chaired by a President that is a prominent figure in standardization or business, this person is elected every two years.

2.3.3 Benefits of standardisation

With globalisation on the increase the world is becoming a smaller place and countries can no longer work in isolation to one another. Trade between countries is on the increase and the larger corporate organisations are becoming more multi-national. If standards did not exist it would make it difficult for any organisation to be competitive in the global market. Standards ensure that the playing fields are levelled and further protect prospective customers when purchasing goods or services.

ISO standards help in the development and production of goods and services to make them more efficient. They further make trade between countries easier and more fairer.

"What does international standardisation mean?" Industry wide standardisation can only exist when goods or services for a particular industry conform to international standards. This achieved via agreements between national delegates representing all the economic stake holders concerned. These include suppliers, customers, governments and special interest groups. They agree on the specifications and criteria to applied.
International standards provide a reference framework between suppliers and their customers. *"A common international technology language which facilitates trade and transfer of technology."*

2.3.4 ISO 9000 family

There are a number of different excellence models around, these are either located nationally or internationally. For the purposes of this research paper however only the ISO 9000 series of Quality Management System will be researched. It is not my intention to debate the merits or de-merits of excellence models against Quality Management Systems.

The difference according to ISO 9000:2000 between the approaches of the quality management systems in the ISO 9000 family and the excellence models lies in their scope of application.

- The ISO family of standards provides requirements for the quality management systems and guidance for improvement.
- The excellence models contain criteria that enable an organisation to compare its performance with the performance of other organisations.

As can be seen from the above ISO fosters the culture of continuous improvement by taking the customers requirements into consideration. With excellence models organisations compare their performance against each other and by not necessarily taking customer requirements into account.

ISO's main activity is the development of technical standards, they do however also have economic and social repercussions. ISO standards not only have a positive influence on engineers and manufacturers for whom they solve basic problems but to society as a whole.

> *"More than half a million organizations in more than 149 countries are ISO 9000 certified which provides a framework for quality management throughout the processes of producing and delivering products and services for the customer."*
> (ISO)

According to Marash, S. A. within five years ISO 9000 has evolved from being "another quality buzzword" to become the most broadly based, fastest growing quality in history. (1994) This statement is further supported by Yeung, A. C. L. Lee, T. S. and Chan, L. Y. who state that it is commonly used internationally. (2003)

ISO 9000 and (14000, Environmental management system) series is among ISO's most widely used standards ever. The majority of ISO's standards are very specific to a particular product, material or process. ISO 9000 and 14000 are however known world wise as "generic management system standards." "Generic" means that they can be applied to any organisation no matter how large or small. They can further be applied to any product including if the product is a service.

"Management system" refers to what the organisation does to its processes or activities. "Generic" implies that no matter what it is or does, if it wants to establish a QMS then such a system has a number of essential features which are spelled out in the relevant standards of the ISO 9000.

ISO is applicable to organizations seeking:

- "*Advantage through the implementation of a quality management system and*
- *Confidence from their suppliers that their product requirements will be satisfied.*"

ISO 9000:2000

The above are the two most important points as I see it for IARC. "*Quality Management Systems can assist organisations in enhancing customer satisfaction.*" SANS ISO 9000:2000. As IARC is no longer a so called "Protected Department" customer satisfaction now plays an important role in the future for IARC. ISO certification will enable IARC to achieve this through continuous improvement.

The ISO 9000 family series works on a process approach whereby continuous improvement, "KAIZEN" is built into the model.

"KAIZEN", originally a Japanese management concept for incremental (gradual, continuous) change (improvement)

See Figure 2-3, Model of a process-based Quality Management System.

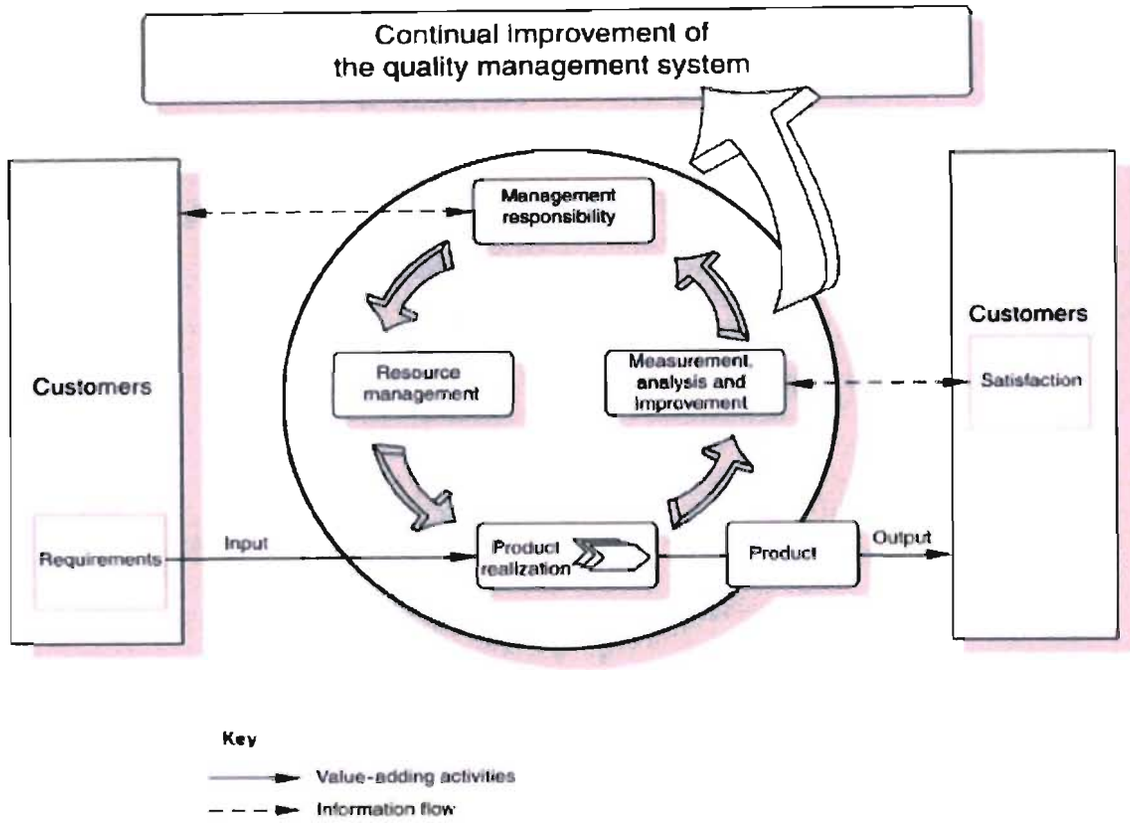


Figure 2-3, Model of a process-based Quality Management System
SABS ISO 9000 2000

ISO 9000 further defines the process flow as follows:

"*Any activity, or set of activities that uses resources to transform inputs to outputs can be considered as a process.*"

The ISO 9000 family consists of four sections, for the purposes of this research paper the first three sections will be applied, namely:

- Quality management systems – Fundamentals and vocabulary SABS ISO 9000:2000
- Quality management systems – Requirements SABS ISO 9001:2000
- Quality management systems – Guidelines for performance improvements SABS ISO 9004:2000

ISO 19011 as stated above does not form part of the research paper, this section provides the guidance on planning and conducting quality audits.

As this is a standard that has been accepted by the South African Bureau of Standards (SABS) it is therefore referenced as SABS ISO 9001:2000. SABS however have are in the process of changing from referencing their documents as "SABS" to "SANS" South African National Standard. Their is however a phasing in period for the renaming of the standards hence the use of SABS ISO and not SANS ISO.

As stated earlier the new version of the ISO 9000 series is the 2000 version which replaced the 1994 version.

> *"Whereas ISO 9001 is a requirement standard, ISO9000, ISO 9004 and ISO 19011 are guidelines. ISO 9001 describes what must be done to make up a quality management system, not how to set it up."*
> (Peach, B. et.al., 2000)

2.3.4.1 SABS ISO 9000:2000

Describes the fundamentals of quality management systems which form the subject of the ISO 9000 family and defines related terms.

2.3.4.2 SABS ISO 9001:2000

Specifies the requirements for a quality management system where an organisation needs to demonstrate the ability to consistently provide a product that meets customer and regulatory requirements. It further aims to enhance customer satisfaction through effective application of the system, including processes for continual improvement.

2.3.4.3 SABS ISO 9004:2000

Provides guidelines beyond the requirements given in ISO 9001 in order to consider both the effectiveness and efficiency of the quality management system.

Effectiveness, what an organisation does to achieve its objectives.
Efficiency, how does an organisation achieve its objectives.
The ISO 9000 family has changed from being a predominantly manufacturing type standard as stated in 1987 and 1994 versions to a more generic type standard for all industries.

Landin, A. et al., state the use of ISO 9000 for quality management is spreading from the manufacturing industry to other sectors such as the construction sector. (2001)

Service and software industries according to Van Houten, G. declined in the beginning to treat ISO 9001 seriously. They justified the lack of interest on the grounds that the standard was applicable only to manufacturing quality management systems. He however continues stating that the more generic and expanded character of ISO 9001:2000 clearly challenges this. (2000)

This can now be clearly seen in the new 2000 version, where it is stated that wherever the term "product" occurs, it can also mean "service".

Van Houten, G. 2000 and Peach, B. et al,. state, the quality management system principle in essence embodies the concept and practice that "*you say what you do and you do what you say*". (2000)

"*Talk the walk and walk the talk,*"
(author unknown.)

This last statement plays an important role in the in the process of achieving continued customer satisfaction. It is important for one to remember that the quality management process is not only saying what you are going to do but in doing it. It must also be remembered that quality is every bodies responsibility and furthermore a never ending but a continual journey towards customer satisfaction.

2.3.5 Conclusion

In conclusion it can be seen that ISO has grown and is still growing into the most dominant quality management system used world wide. The introduction of the 2000 version of the ISO 9000 family has expanded the use of ISO from a predominantly manufacturing standard to a standard that can be implemented by all sectors of the industry.

Finally the ISO 9000 family works on the principle of an organisation being able to understand its customers needs and expectations. For a quality system to be effective it should be designed to satisfy customers needs and expectations, (Landin, A. et al., 2001)

"*ISO (International Organisation for Standardisation) is the world's largest developer of standards.*" (ISO)

At this point in the research paper I would like to propose the following:

"*The ISO 9000 family is to quality management systems as Hoover is to vacuum cleaners.*"

The reason for the above statement is that the majority of literature references ISO 9000 and no other system. When people are in the market to purchase a vacuum cleaner they mostly state that they are going to purchase a Hoover.

2.4 IMPLEMENTING ISO 9001:2000

2.4.1 Costs and negative perceptions associated with the implementation of ISO 9001:2000

With the implementation of any system, - which for this research paper is ISO 9001:2000 be it a new system or an upgrade to an existing system, costs will be incurred and ISO 9001:2000 is by no means immune to this cost. Costs involved when implementing a system such as ISO 9001:2000 can vary substantially and be broadly categorised into three categories namely:

- Registrars costs (External),
- Consultants costs (External if appointed) and
- Resource costs (Internal).

Registrars costs: management has two options at this point namely:

- Option 1 Readiness assessment if required,
  Assessment fee,
  Annual registration fee. (No re-assessment fee is charged)
- Option 2 Readiness assessment if required,
  Assessment fee,
  Annual registration fee and
  Re-assessment fee is charged.

The difference between the two is the re-assessment fee. This is due to the fact that with option 1 a slightly higher annual registration fee is paid that negates the three yearly re-assessment fee. With option 2 the yearly fees are less but the there is a cost involved with the three yearly re-assessment.

The costs are further affected by the number of permanent staff members within the department and finally by the amount of sites other than the office deemed to be the head office. Head office is deemed to be the major office where the department manager is positioned. Other sites are offices other than the head office where permanent staff members are employed and documentation is stored. (Note, the registrars costing structure has been based on SABS methodology.)

Consultants costs: these costs are directly proportional to the amount of time that the consultant helps with the implementation process. Generally consultants have a rate per hour or day and will therefore bill you against their time. This cost can have two extremities; no cost at all which implies that a consultant has not been used at all or a considerable cost which implies that a consultant has been used throughout the entire process. There is however a third option, "the preferred option" which lies in between the two extremities. The reason for this being the preferred option is that once the "Gap Analysis" has been completed the organisation usually has a pretty good idea as to where they stand and where they need to be.

Resource costs: these costs are generated by the staff members who have been appointed to the Steering Committee and the members who then have been appointed to the Work Group to work on the implementation process.

The external costs are easier to budget for than the internal costs. The reason being that costs for the Registrar and Consultant are quoted costs and the organisation has to physically pay this amount which is reflected. The internal costs however are more difficult to budget for, as employees are used and no money exchangers are undertaken.

Management has to realise that there are costs involved and certification/registration is a costly exercise. Further to this they must also realise that resources are required and need their support.

According to Murakami, R. internal costs can be as high as 200000 dollars US with external costs totalling approximately 45000 dollars US depending on the role of the consultant (1994) . He also splits external costs between registrars and consultants. Implementation costs of approximately 200000 dollars US is also quoted by (Marash, S. A, 1994.)

The implementation of the quality system is the process of not only goodwill efforts but as well as significant financial investment, (Ruzevicius, J. juozas.ruzevicius@ef.vu.lt. Adomaitiene, R. Sirviadaite, J. 2004.).

Schmitt, G. L. states that the implementation process can take as long as 18 to 24 months and can be costly. (2001)

Numerous researches such as Powell, (as cited in Love, P. E. D. et al., 2000 and Landin, A. et al., 2001) argue the benefits of any QMS. Powell argues that the cost of implementation far outweighs the benefits achieved through ISO certification. Landin on the other hand disagrees with the survey results posted by researchers on the benefits of ISO certification. She states that the results of implementation are skewed as it is only the success stories that are documented and that no mention is made of the failures.

Yeung, A. C. L. et al., suggest that ineffectiveness of the ISO 9000 is largely due to incorrect management objectives and expectations from the standard. They further state that the effectiveness of the ISO is dependant on the attitudes and commitment of senior management (2003).

2.4.2 Benefits associated with the implementation of ISO 9001:2000

As can be seen from above, the costs associated with ISO 9001:2000 certification are not trivial and should not be taken lightly. Ruzevicius, J. et al., state that every company dedicating financial and other resources to the new project expects a return on those investments (2004.),

Benefits however can be realised within 6 months of obtaining registration by decreasing the cost of running a project says, (Schmitt, G. L. 2001.)

The benefits associated with the successful implementation of ISO 9001:2000 quality management system are numerous. The first and possibly most important benefit that can be achieved through ISO 9001 certification is customer satisfaction. Customer satisfaction will help with the retention of an organisations current customer base and the increase of that customer base with the acquisition of new customers through marketing their ISO 9001 certification.

With the advent of globalisation competition for customers has increased, these customers need not only be in the country where the organisation is situated but could be situated in another country or even another continent. Organisations need to realise this threat and use it to their advantage. ISO 9001 certification opens doors for an organisation and this in turn leads to the continual growth of that organisation.

Kee-Hung Lai, et. al., state that due to the rapidly changing market and economic environments in the 1990's characterised by such phenomena such as globalisation and deregulation of markets, increasing expectations of customers and rapid technology transfer have presented challenges to most companies in Hong Kong. In response to these challenges many of them have joined the quality movement and implemented various quality improvement programmes such as ISO 9000 series as a means to enhance competitiveness. (2001)

Dick, (as cited in, Ruzevicius, J. et al., 2004.) is of the opinion that the motivation for pursuing quality certificate (ISO 9000) is the benefit of such certification opening customers doors that were previously closed, or would close if such certification was not achieved. They state further that the majority of companies use a quality management system certificate when advertising their company.

Rayner and Porter, (as cited in Beattie, K. R. and Sohal, A. S. 1999.) found that the major reason for UK based organisations introducing ISO 9000 system were marketing reasons. This statement is further supported by Brown and Van der Wiele (as cited in Beattie, K. R. and Sohal, A. S. 1999.) when discussing Western Australian companies.

Hughes, T. et al., also quote marketing reasons for ISO 9001 certification. They further state client pressures as a motivation factor. (2000.)

Lee, K S. and Palmer, E. in their studies of New Zealand based firms specifically small companies found that when external factors alone were the driving force behind ISO 9000 certification this led to difficulties in maintaining ISO, "*Reactive approach*". They state further that a poor understanding of how ISO relates to TQM leads to difficulties in maintaining ISO. (1999). See, Figure 2-4, Quality Implementation in Small Companies: ISO 9000 only

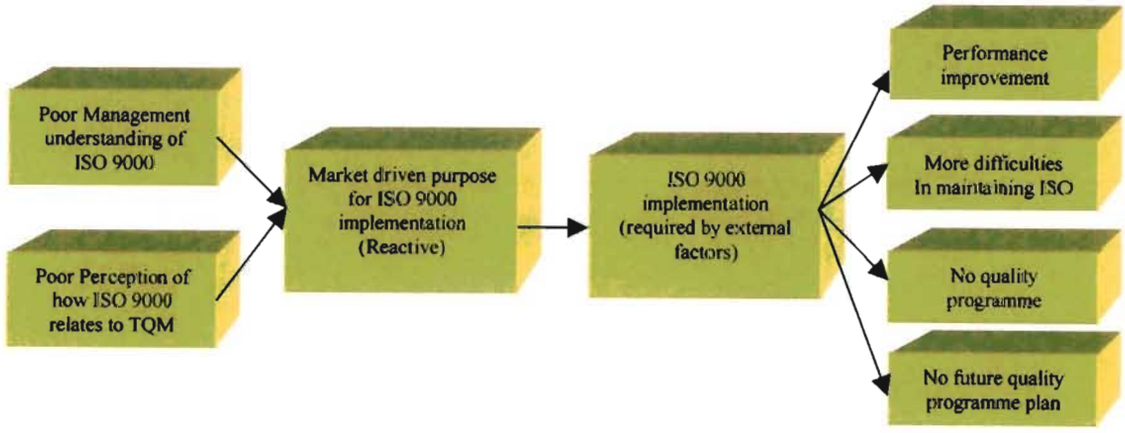


Figure 2-4, Quality Implementation in Small Companies: ISO 9000 only
(Lee, K. S. and Palmer, E. 1999)

Lee, K S. and Palmer, E. in their studies of New Zealand based firms specifically large companies found that when internal factors were the driving force behind ISO 9000 certification this led to less difficulties in maintaining ISO, "*Active approach*". They state further that a good understanding of how ISO relates to TQM leads to less difficulties in maintaining ISO. (1999)

See, Figure 2-5, Quality Implementation in Large Companies: ISO and TQM

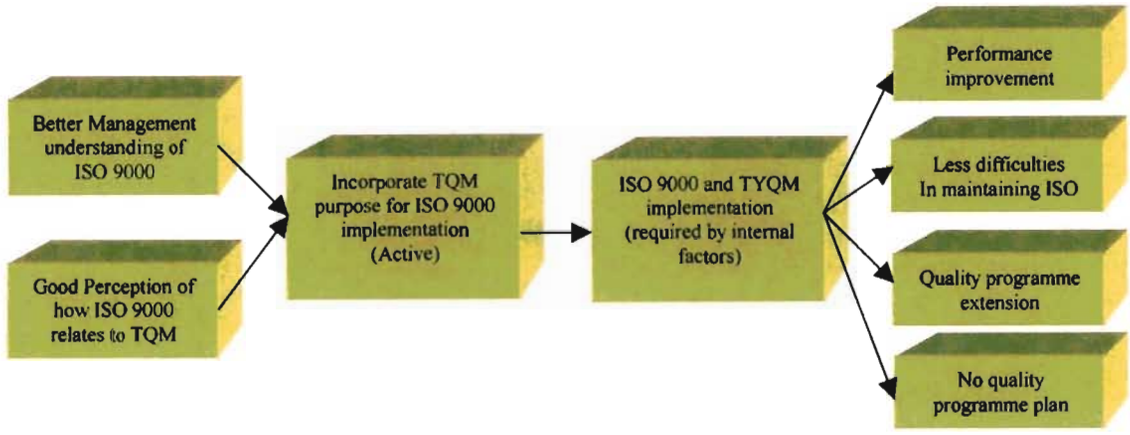


Figure 2-5, Quality Implementation in Large Companies: ISO and TQM
(Lee, K. S. and Palmer, E. 1999)

Lee, K. S. and Palmer, E. suggest there is evidence that Small manufacturing New Zealand companies implement systems very differently from large manufacturing companies. They state further that large companies are more knowledgeable than small companies about the need to adopt a TQM culture. (1999)

Van der Wiele, T. and Dale, B. found that when there was a strong external pressure to develop a QMS only short term performance was realised. Internal pressure results in more longer term improvements. They also found that in the latter situation organisations had already made the shift towards TQM (2000).

Ruzevicius, J.et. al., identified through their research that there are two motives indicated by organisations in the introduction of a quality management system and those are both external and internal factors. (2004.)

Now that an organisation has achieved ISO 9001 certification and has achieved its benefits such as marketing power, customer retention and growth through customer satisfaction are their any other benefits that can be achieved? The answer is most definitely yes, yes and yes. The above are all external benefits that an organisation can realise, their are however internal benefits that can be realised as well.

Internal costs as Ruzevicius, J. et al., put it are production defects and production productivity. They found in their survey that production defects decreased by (85,7%) while labour productivity increased by (14,3%). (2004.)

Josephsson, (as cited in Landin, A. et al., 2001) state that the cost of rework was found to be considerable in relation to the contract sum. The absence of a quality focus throughout the supply chain contributed to significant amounts of rework being experienced, (Love, P. E. D. et al., 2000). Both are of the opinion that the implementation of a quality management system can alleviate these costs.

Sweet, M. found that more than a half a million contractors in the United States came to realize that quality (the execution, not the word) could lead to increased profitability, greater employee and customer satisfaction and enhanced ability to market their firms. (1999)

Yeung, A. C. L. et al., in their research found that companies that obtain certification as a foundation for continuous improvement (TQM) to increase product quality consistency and to review and improve their QMS are highly associated with both more reliable and more cost-effective operations (2003).

Both Lee, K. S. and Palmer, E. (1999) and Yeung, A. C. L. et al.,(2003) found that the implementation of ISO 9000 goes hand in hand with the adoption of TQM.

IARC is also affected by both the external and internal factors. The retention of customers is vitally important to the future of IARC without them IARC would not exist. Due to the fact that IARC predominantly producers documents the cost of rework will be to the detriment of IARC in the long term.

Swedish construction companies are strongly convinced that it is both beneficial and profitable to employ a quality system, (Landin, Anne. et al., 2001)

2.4.3 Minimum requirements associated with the implementation of ISO 9001:2000

2.4.3.1 Introduction

Any quality management system consists of a group or list of guidelines, disciplines and processes that together are aimed at achieving customer satisfaction and or continuous improvement, (TQM). The ISO 9000:2000 family is in no ways different to this. The one major basic requirement as stipulated by ISO 9000 is traceability. This implies that all levels within the organisations management system shall be documented.

There are three basic requirements of the ISO 9001:2000 standard:

- Document your processes that affect quality,
- Retain records and data that describe the quality of the service or product and
- Ensure that your processes produce consistent quality.

2.4.3.2 Levels

ISO 9001:2000 works on a four tier system, ie four levels namely;

- Level 1, Quality Manual.
  Consists of the organizations quality policy, structure, statement of authority and Responsibility, identifies customers and products or services.
- Level 2, Procedures, Standards, Guidelines etc.
  Contains the objective/purpose, scope, responsibilities, definitions and documentation required.
- Level 3, Work/Job instructions.
  These describe how the work is accomplished and are normally written by the operators.
- Level 4, Forms.
  Prompts recording of forms that become a quality record.

2.4.3.3 Management principles

ISO have identified eight quality management principles to facilitate achievement of quality objectives:

- **Customer focus:** understanding the customers current and future needs, meeting customer requirements and striving to exceed customer expectations.
- **Leadership:** ensuring unity of purpose and direction for the organisation and establishing the organizations internal environment.
- **Involvement of people:** developing abilities fully and then using these abilities to maximum benefit.
- **Process approach:** managing resources as a process and achieving desired results more efficiently.
- **Systems approach to management:** understanding and managing the interrelated processes of a system to effectively and efficiently attain objectives.
- **Continual improvement:** making improvement a permanent objective. Factual approach to decision making, analyzing data and information logically.
- **Mutually beneficial supplier relationships:** creating value through mutually beneficial interdependent relationships.

2.4.3.4 Primary clauses

ISO have five primary clauses that spell out the requirements:

- Quality Management system,
- Management responsibility,
- Resource management,
- Product realization and
- Measurement analysis and improvement

2.4.3.5 Compulsory procedures

When reading through ISO 9001:2000 there are to key words that one must look for and these are, "*Documented* and *Shall*". When applying this to ISO, the minimum number of procedures that need to be produced are six namely:

- Control of Documents, (4.2.3)
- Control of Records, (4.2.4)
- Internal Audit, (8.2.2)
- Control of Non Conforming Product, (8.3)
- Corrective Action and (8.5.2)
- Preventive Action (8.5.3)

It is however important to remember that the six compulsory documents ***do not*** have to be individual documents but can be combined. If they are combined however it is extremely important to ensure that one can still differentiate between the different documents.

2.4.3.6 Documents versus Records

It is very important that all organizations applying for ISO 9000 certification distinguish between Documents and Records:

- **Documents:** are generally permanent of nature unless they are being revised and describe or define systems, processes, procedures and products.
- **Records:** provide current and historic evidence of activities conducted. They are reports of results achieved or evidence of activities performed at a given time.

To put the above in a nut shell. Documents, (Procedures, Standards or Guide Lines) are standard through out the organization. They spell out the process with the responsibilities and indicate what must be done and how.

Records on the other hand are also standard in format throughout the entire organization but are completed every time a product is produced.

With in IARC there are numerous sections that produce various products or services, they all however work with the same documents (procedures etc). The records (forms) are also standard but are completed individually for each and every product or service.

2.4.3.7 Conclusion

In conclusion ISO 9000 requires that an organisation fully understands their customers (External and Internal) requirements and then ensures that those customers needs are met. It is very important for the organisation to remember that ISO certification is the first phase in the process. Only after certification is achieved can the organisation implement TQM to continually improve on their processes.

Finally the organisation must realise that the ISO 9000 family Management System is dynamic and not some system that has to be implemented and then forgotten about. The certification auditors carry out bi-annual surveillance audits on the implemented system and can therefore cancel the certification if irregularities are found.

2.4.4 Implementation process for ISO 9001:2000

2.4.4.1 Introduction

As can be seen from chapter 1, there appears to be no prior research undertaken into this research topic. Further the amount of literature available for this paper is therefore very limited. Due to this fact three different articles will be discussed.

2.4.4.2 Implementation Peach. B. et al., (2000)

Offer a generic process that organisations tend to follow to achieve ISO 9001 quality system *registration*. They use the term *registration* as opposed to the more commonly used certification. Let us discuss their reasoning. They are of the opinion that individuals can be certified to do certain tasks and that individually manufactured products may be certified.

They further state that ISO 9001 does not state that every product meets specification requirements only that the quality system in use is capable of meeting requirements.

They base their implementation approach on four stages:

- **Stage 1: Organising for registration.**
- **Stage 2: Preparing for registration.**
- **Stage 3: Experiencing the registration audit.**
- **Stage 4: Continuous registration through surveillance audits.**

2.4.4.2.1 Organising for registration

- Obtain management commitment.
- Establish a steering team.
- Train key team
- Begin internal quality auditing
- Select a registrar.

2.4.4.2.2 Preparing for registration.

- Document existing processes.
- Determine if exclusions of certain clauses are justified.
- Identify areas needing improvement.
- Adopt improved quality procedures.
- Prepare the quality manual.
- Apply to your registrar for an assessment.
- Submit the quality manual to the registrar for review.

- Arrange to have a pre-assessment done by your registrar (optional)
- Respond to the pre-assessment recommendations.
- Conduct a "dress rehearsal" audit.
- Submit your revised manual to the registrar.
- Modify and finalise quality practices; train personnel

2.4.4.2.3 Experiencing the registration audit.

- Arrange for your registrar to conduct the assessment and identify findings.
- Respond to the findings.
- Submit to the registrar for review the corrective actions you will take.
- The registration certificate is awarded.

2.4.4.2.4 Continuous registration through surveillance audits.

- Maintain quality practice to ensure continued compliance.
- Notify your registrar of major changes in practice.
- Arrange for your registrar to conduct semi-annual surveillance audits.
- Continue to improve.

2.4.4.3 Implementation Murakami. R. (1994)

Proposes a five step approach excluding the surveillance audit.

- **Step 1: ISO assessment.**
- **Step 2: Quality assurance and quality policy manual preparation.**
- **Step 3: Training of employees in ISO 9000.**
- **Step 4: Documentation of work instructions.**
- **Step 5: Registration audit.**

2.4.4.3.1 ISO assessment

- Compare existing documentation to the ISO requirements.
- Generate a report identifying non-compliances.
- Assessment provides blue print for implementation

2.4.4.3.2 Quality assurance and quality policy manual preparation

- Prepare quality policy and manuals.
- Use applicable software if wanted to help with the preparation.

2.4.4.3.3 Training of employees in ISO 9000.

- Quality vocabulary per ISO requirements.
- Requirements of each section of the standard.
- Role of quality policy and quality manuals.
- Internal auditing.

(Recommends the attendance of external courses.)

2.4.4.3.4 Documentation of work instructions.

- Documentation of existing work procedures and instructions and the introduction of new procedures and paper work.
- Each new procedure to be documented, process flow charts are prepared and forms are mocked up.
- The procedure is reviewed by those that will use it or be affected by it.
- The procedure is introduced into the facility.
- The team monitors the procedure for a number of weeks for compliance.

(Employee involvement encouraged)

2.4.4.3.5 Registration audit.

- Final stage in implementation. Registrar will conduct annual or semi annual audits for ISO system to test compliance.

(This step should be anti-climatic if the forward work has been done correctly.)

2.4.4.4 Implementation Kee-hung Lai. C. J. et al., (2001).

Proposes a ten step approach.

- **Step 1: Management commitment.**
- **Step 2: Quality improvement team.**
- **Step 3: Quality measurement.**
- **Step 4: Quality awareness.**
- **Step 5: Manager and supervisor training.**
- **Step 6: Goal setting.**
- **Step 7: Error cause removal.**
- **Step 8: Corrective actions.**
- **Step 9: Recognition and reward.**
- **Step 10: Continuous improvement.**

2.4.4.4.1 Management commitment.

- Ensure top management supports the QMS.
- Top management to communicate such support.
- Top management to define a set of measurable quality and performance objectives.

2.4.4.4.2 Quality improvement team.

- Conduct customer surveys to understand customer require ments.
- Assemble a QMS team.

2.4.4.4.3 Quality measurement.

- Develop quality improvement model.
- Identify the most significant outputs.
- Incorporate into quality policy.

2.4.4.4.4 Quality awareness.

- Create quality awareness amongst the staff.
- Communicate top managements vision about quality management.
- Educate employees on the concepts of quality.

2.4.4.4.5 Manager and supervisor training.

- Conduct training seminars for managers and supervisors.
- Arrange meetings between management and staff to ensure support.

2.4.4.4.6 Goal setting.

- Turn commitment into action
- Ensure that all staff incorporate customer satisfaction as a key objective in their work.

2.4.4.4.7 Error cause removal.

- Encourage staff to communicate to management difficulties in implementing the QMS.
- Management to commit to listening to staff and implementing positive feedback.

2.4.4.4.8 Corrective actions.

- Implement periodic preventive maintenance of work processes.
- QIT to hunt for specific problems.

2.4.4.4.9 Recognition and reward.

- Reward staff participation.
- Empower staff to make decisions.
- Encourage teamwork.

2.4.4.4.10 Continuous improvement.

- Repeat cycle of continuous improvement.
- Ensure that quality improvement is enduring and never ending.
- QIT to meet periodically to review the QMS.

2.4.4.5 Conclusion.

In conclusion there appears to be no universally accepted sequence for an organisation to follow to achieve ISO 9001:2000 certification.

2.5 TOTAL QUALITY MANAGEMENT

2.5.1 Introduction

Shakespeare's eternal question, *"What's in a name?"* can be asked of quality. *"Does the word quality denote a desirable characteristic in output goods and services? Or does it describe processes that make and deliver those outputs in ways that please customers? Or, especially when appended with the word management and preceded by the word total, does it refer to an even bigger picture - an overall approach to running organisations? The answers are yes, yes and yes. The quality concept is both comprehensive and complex."*
(Schonberger, R. J. and Knod, E. M. JR. 1997.)

The statement implies that TQM is to be applied throughout the entire business, from top management down to the floor sweepers. Quality is everybody's responsibility. Quality can further be defined as conformance to customers' requirements but it, however, does not stop there. "KAIZEN" continuous improvement does not allow for an organisation to become static, but rather looks for ways of improving the existing process within the organisation.

2.5.2 Quality gurus

There have been a number of quality pioneers "*Gurus*" of the twentieth century:

- W.Edwards Deming
- Joseph M. Juran
- Armand V. Feigenbaum
- Kaoru Ishikawa
- Phillip B. Crosby
- Genichi Taguchi.
- (Schonberger, R. J. et al., 1997.)

Each of the above listed "*Gurus*" has their own definitions for quality:

2.5.2.1 W. Edwards Deming

The basic philosophy "is that quality and productivity increase as Process Variability (The unpredictability of the process) decreases" he has further defined the 14 points for quality improvement.

2.5.2.2 Joseph M. Juran

Juran states that "Conformance to specification is not the ultimate" he further quotes "*Fitness for use*". He fully believes in the quality trilogy of "Planning, Control and Improvement".

2.5.2.3 Armand V. Feigenbaum

"*An effective system for integrating the quality development, quality maintenance, and quality improvement efforts of the various groups in an organisation so as to enable production and service at the most economical levels which allow for full customer satisfaction*".

2.5.2.4 Kaoru Ishikawa

Ishikawa's work is based on Deming, Juran and Feigenbaum. He has been credited with originating the concept of "Quality *Circles and cause and effect diagrams*".

2.5.2.5 Phillip B. Crosby

Is best known for his work on "*cost of quality*". He further believes in the concept of "*Zero Defects*" as the only acceptable quality goal.

2.5.2.6 Genichi Taguchi

Taguchi defines quality as the "*Concepts of the loss which is imparted by the product or service to society from the time it is created*". His "*Quality Loss Function (QLF)*" includes such factors as "*Warranty Costs, Customer Complaints and Loss of Customer Goodwill*"

2.5.3 Quality gurus summarisation.

Professor John Oakland, an authority on TQM quotes, *"They are all talking the same language but they use different dialect's"*.
(Pycraft, M. Singh, H. Phihlela, K. Slack, N Chambers, S. Harland, C. Harrison, A. and Johnson, R. 1997.)

Even though each "*Guru*" has his own opinion and his own specific definition they all equate to the same ideology "*QUALITY*".

They go to imply that the benefits associated with quality are numerous and only once that the quality culture has been instilled within an organisation can it then reap the benefits.

2.5.4 TQM in general.

TQM is a philosophy, a way of thinking and working, which is concerned with meeting the needs and expectations of the customers whether they are internal or external. TQM further moves quality away from being purely an operations activity, but to that of the entire organisation. TQM becomes the responsibility of the entire organisation, every person is involved, with ultimately reducing all of the costs of quality, in particular failure costs. TQM further stresses the importance of continuous improvement.

The South African Army a number of years ago confirmed, "*That TQM will be a strategic priority of the staff of the SANDF in providing a high quality arm of service and combat ready force*".
(Management Today. 1999.)

Calgary based Canadian Airlines International President and CEO Kevin J. Jenkin quotes:

> *"Organising a basic flight schedule and loosely adhering to that schedule will not make an airline stand out. Having exceptional service will".*
> (Schonberger, R. J. and Knod, E M.JR.. 1997.)

They introduced a service quality program in 1990, since then mishandled or delayed baggage has decreased by 75% and speed of telephone response has increased by 71%.

2.5.5 TQM and Competitiveness

Gabriel Pall, director of the IBM Quality Institute quotes, *"Market-Route benefits begin when improved quality increases the products value in the eyes of the customer. The provider may raise prices or – by holding prices steady – realise a gain in market share: revenue increases in either case. Cost route benefits accrue because increased defect free output cuts operating profits".*
(Schonberger, R. J. and Knod, E M.JR. 1997.)

See .Figure 2-6, Quality Process Management

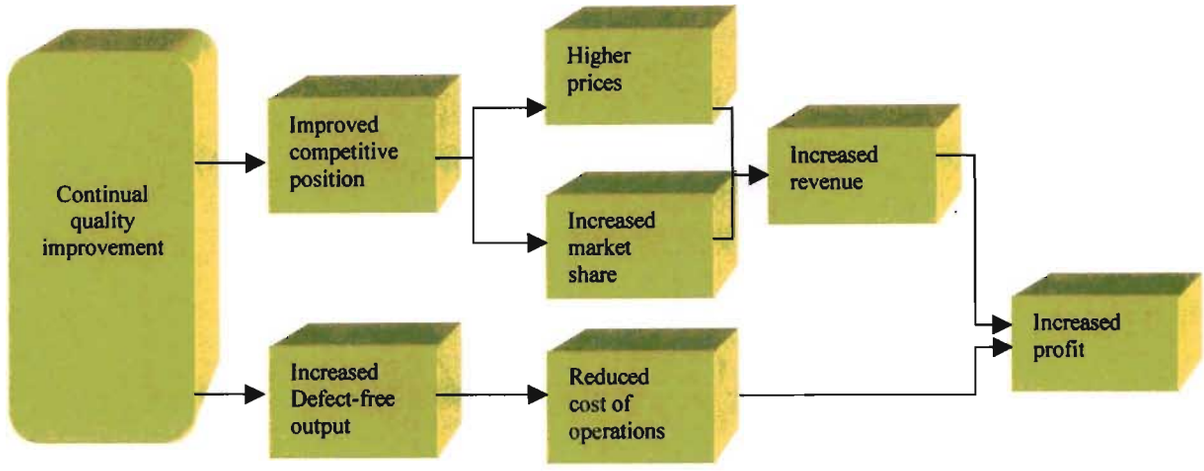


Figure 2-6, Quality Process Management
(Schonberger, R. J. and Knod, E M. JR. 1997.)

2.5.6 TQM Implementation

This does not happen overnight, rather it takes a concerted effort by all parties involved to successfully implement it. The implementation process can be categorized into six stages, as quoted in (Pycraft. M. et al., 1997.)

"A quality strategy, top management support, a steering group, group based improvement, success is recognised and training".

The above implies that the organisation needs to know where it is headed for, as the saying goes, *"If you don't know where you are going any road will get you there".* There also need to be goals with guidelines.

It is very important to get the support from top management. It has further been quoted; *"Top management commitment is ranked top @ 92% in quality barriers"* (Pycraft, M. et al., 1997.)

A steering group is further required to plan the implementation. It is further responsible for the monitoring of the programme.

Staff who work in the operation know its strengths and weaknesses and generally know the operation backwards, they are the people with the experience and will be affected by changes to it.

Success should further be recognised on a formal basis to the improvement teams for the efforts that they are putting in.

Last but not least, Training plays an important part in the process. It has been confirmed that the majority of successful programmes have had full time training managers.

2.5.7 Conclusion

In conclusion it must be noted that TQM cannot be implemented overnight, and if one would like to reap the rewards of implementing TQM then one has to be persistent.

2.6 CHANGE MANAGEMENT

2.6.1 Introduction

The question is continuously asked, why change? Leave the organisation as is.

"The times they are changing", sang Bob Dylan. Always something new is coming in, the organisation is restructured, the company gets taken over, or new government regulations or deregulation come in and change everything. Change – it's the one aspect of life that never seems to change. It happens all of the time. The only thing is that there seems to be more of it and it happens more and more quickly. There is never time to catch your breath.

2.6.2 Change and the future

There is no stability nowadays. You no sooner get things sorted out and there is a restructuring, a product change or a new competitor running away with our business. You just get the line running smoothly and rejects to a minimum when in comes new technology or a new system is introduced and chaos it let loose.

You sigh for the old days when you knew where you were: yes, things did change then, but much more steadily. You had time to absorb changes – or so you think now (Wille, E. and Hodgson, P. 1991.)

This implies that the further one goes into the future and the world market becomes more global that change will occur on a steadier basis. In the so-called "*Old Days*" when technology was very basic and organisations had their own niche markets, due to the lack of competitiveness, change could be introduced at a much slower rate.

Every day a new competitor announces himself, a new product is launched into the market or there are firms in other industries offering substitute products. IARC is not immune to this syndrome and is going to be competing against consulting firms and other organisations that see the industry as a niche market. This competition will not only come from South African based organisations but also from organisations abroad.

See, Figure 2-7, How competitive forces shape strategy

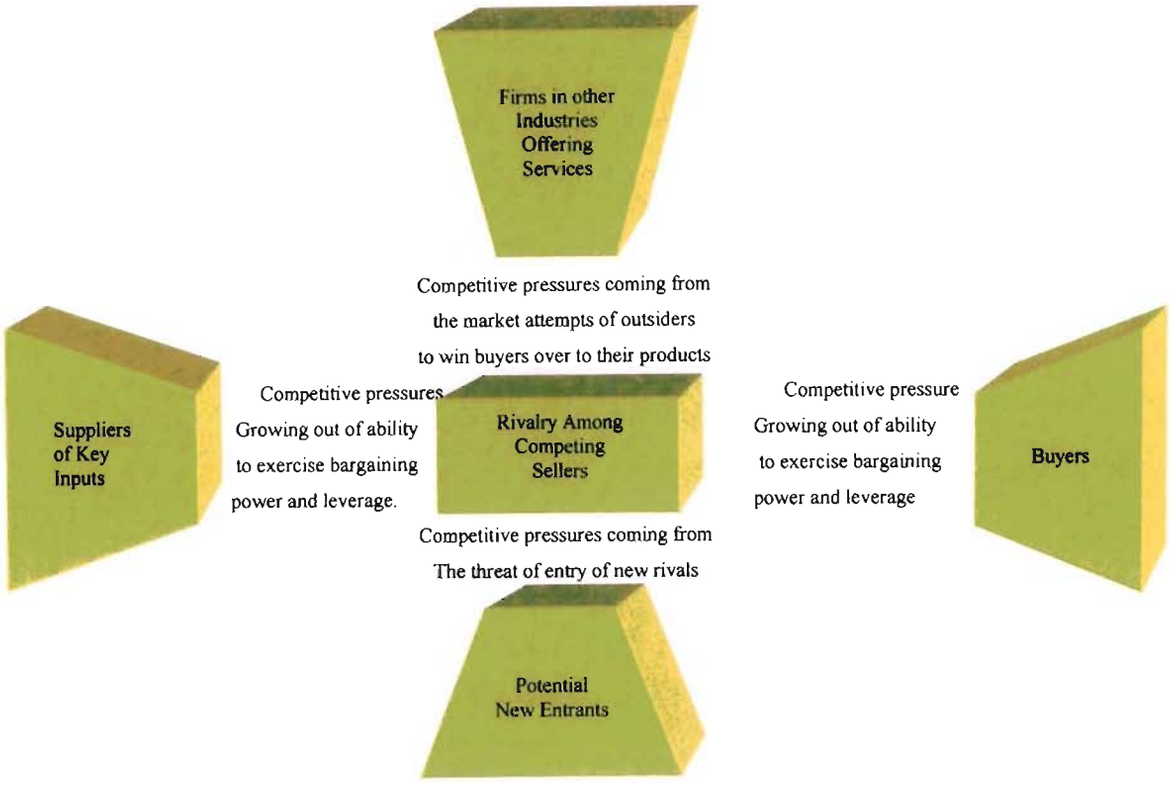


Figure 2-7, How competitive forces shape strategy
(Thompson, A. J. R. and Strickland, A.J. 1995.)

2.6.3 Learning and change

Reg Revans of Action Learning fame quotes the L & C process (as cited in Wille, E. and Hodgson, P. 1991.) *" L > C & C < L, if learning is represented by L and change is represented by C, then the first symbol means that you are ahead in the game – you are learning faster than things change. The second symbol can spell disaster because things are changing faster than you are learning, so that you are behind in the race."*

This further cements the reason for being pro-active and not re-active. In today's changing world should you want to remain competitive, you should then be adapting to change continually.

David Kolb, of Case Western Reserve University in Cleveland Ohio quotes, (as cited in Wille, E. and Hodgson, P. 1991.)

"Life is a series of experiences which make us what we are. The next stage of the cycle or circle or spiral, see, Figure 2-8, The learning cycle is that we reflect upon the experiences that we have just had. Thirdly we draw out some concepts and some principles from this reflection. Finally, we test out the new concepts in new situations so that they become part of the ongoing experience, on which we shall continue to reflect, and so on in a never ending circle or even spiral."

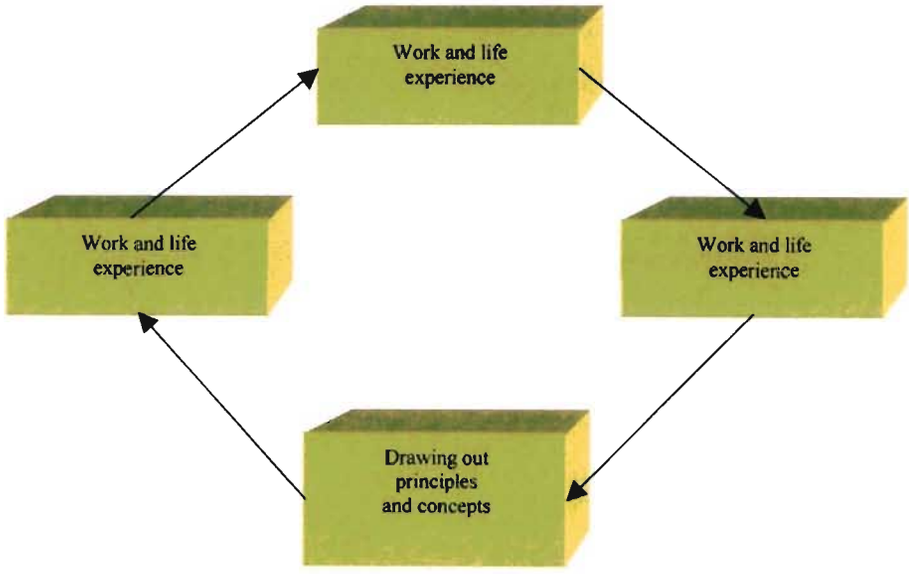


Figure 2-8, The learning cycle
(Wille, E. and Hodgson, P. 1991.)

Both Kolb and Revans agree that *"Change is Learning"*. They further quoted *"When you learn, you change. When you change, you learn."* (Wille, E. and Hodgson, P. 1991.)

Alfred North, the celebrated mathematician, quoted, (as cited in (Wille, E. and Hodgson, P. 1991.) *"The more apt name for human beings was human becomings, because we are never in a static state of being but on the move all the time, in process, or changing every micro-microsecond."*

George Henry Mead, late of Chicago University, gave rise to the sociological and psychological theory, academically known as *"Symbolic Interactionism."* (Wille, E. and Hodgson, P. 1991.)

He further quoted, *"Every interaction makes a contribution to the mental make-up of the other. When you have had interaction with someone you go away a different person."*

2.6.4 Change and trauma

Change and individual trauma, in the same way organisations go through stages of growth and development, so do individuals. Adams, Hayes and Hopson (as cited in Wille, E. and Hodgson, P. 1991.) have split the transition stage into seven phases.

See, Figure 2-9, Self Esteem During Transition Changes.

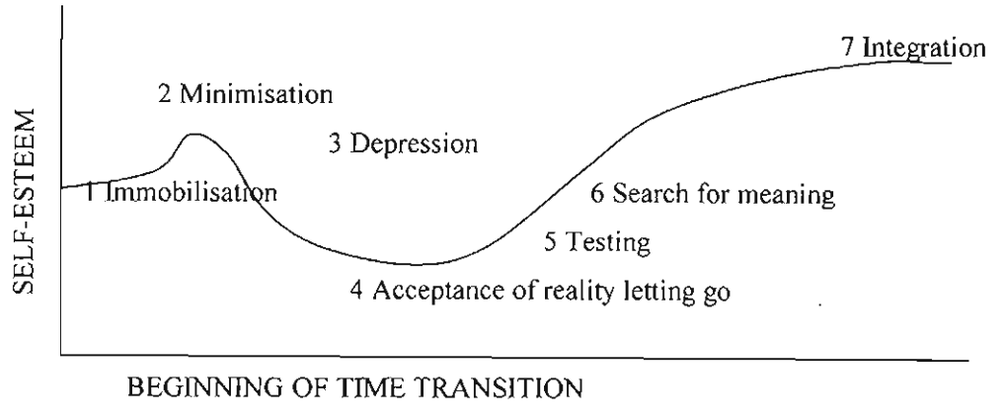


Figure 2-9, Self Esteem During Transition Changes
(Wille, E. and Hodgson, P. 1991.)

The graph is represented by Self Esteem on the "Y – Axis" (Vertical) and Time Transition on the "X – Axis" (Horizontal). Adams, Hayes and Hopson are of the opinion that change is directly linked to self esteem hence the resistance to change. This graph then identifies the fact that the sooner you get people on board and make them part of the change the sooner they will accept it.

Once people have accepted that the world will never be the same again, then new opportunities may present themselves. In order for an organisation to remain competitive in today's global market, it has to recognise change as an ongoing occurrence and to tackle it with fresh enthusiasm every time.

2.6.5 Conclusion

So thus in conclusion, all four agree that change is part of being human, and that human and change go together, hence change should be adopted with less fear than is currently happening.

Thomas Wolf (as cited in Want, J. H. 1995.) quotes *"You can't go home again because home ceases to exist except in the mothballs of one's own memories."*

2.7 ORGANISATIONAL CULTURE

2.7.1 Introduction

The success of organisational change is very reliant on the culture of the organisation within. Many a good plan has failed due to the attitude of the staff and many a bad plan has been successfully implemented due to the attitude of the staff. In other words the culture within the organisation is very critical to the success of a plan. Shelly A. Kirkpatrick and Edwin A. Locke (as cited in Thompson, A. A. JR and Strickland, A.J. 1995.) quote *"Effective leaders do not just reward achievement, they celebrate it"*. A further quote from Shelly A. Kirkpatrick and Edwin A. Locke, (as cited Thompson, A A. JR and Strickland, AJ. 1995.) states, *"Weak leadership can wreck the soundest strategy, forceful execution of even a poor plan can often bring success"*.

Each organisation has its own unique organisational culture. Each has its own embedded patterns of "*How we do things around here*". Culture can be defined as the unwritten laws eg, "*That chair in the boardroom is Mike's chair, or this is how the documentation should flow etc*".

2.7.2 Where Does Corporate Culture Come From

"*A corporate culture is a product of internal social forces. It represents any interdependent set of values and behavioral norms*", (Thompson, A A. JR and Strickland, AJ. 1995.) Corporate culture is not only found at organisational level, but also found at departmental level, subcultures do exist within each area. Values, beliefs and practices vary from department, geographical areas etc.

2.7.3 The Power of Culture

Most managers accept that an organisation culture is an important contributor or obstacle to successful strategy execution. IBM CEO, Thomas Watson JR, stated the case for a culture-performance link eloquently in a 1962 speech at Columbia University, "*The basic philosophy, spirit and desire of an organisation have far more to do with its relative achievements than do technological or economic resources, organisation structure, innovation and timing. All theses things way heavily on success. But they are, I think, transcended by how strongly the people in the organisation believe in its basic precepts and how faithfully they carry them out*". (Thompson, A A. JR and Strickland, AJ. 1995)

Therefore, if an organisation believes goals and practices called for in a strategy are compatible with its culture, it usually is easy to implement the strategy successfully and visa versa.

2.7.4 Strong Versus Weak Cultures

A weak or fragmented culture leads to employees having no deep felt company identity, they view the organisation purely as a place of work. A strong culture on the other hand results in a clear and explicit set of principles and values that management spends time on communicating to their employees.

Three factors that contribute to the development of strategically supportive strong cultures (Thompson, A. A. JR and Strickland, A. J. 1995)

"A strong leader who establishes values, principles and practices that are consistent and sensible in light of customer needs, competitive conditions and strategic requirements, a single, long standing company commitment to operating the business according to these established traditions and a genuine concern for the well-being of the organisation's three biggest constituencies – Customers, Employees and Shareholders".

Organisations that are prone to fast changes have to create an "**Adaptive Culture**", in these cultures, management genuinely cares about the well-being of their Customers, Employees and Shareholders. Entrepreneurship is further encouraged and rewarded. Strategies are modified to take advantage of changes in the business environment.

2.7.5 Creating the fit Between Strategy and Culture

It is ultimately the responsibility of the "Strategy- Makers", to select a strategy that is compatible with the existing organisational culture. He has to change whatever facets of the culture that may hinder the effective execution of the plan. Changing the organisation culture or aligning it with the strategy is one of the most difficult things to do. It is very important to talk to the staff first and get their input and then to ensure that visible changes are made quickly.

2.7.6 Building a Spirit of High Performance Into the Culture

This aspect focuses on achievement and excellence. The majority of these organisations are people orientated. To create such an organisation the organisation must make champions out of the people who turn in wining its entire chain. It begins with a competition to determine the best hamburger cooker in each store. Store winners go onto compete in regional championships, and winners go to the All-American contest. The winners get trophies and an All American patch to wear on their shirts. (Thompson, A. A. JR and Strickland, A. J. 1995)

2.7.7 Dealing with Politics

The strategy manager needs to know the organisation backwards, who wields influence in the executive ranks, who is open to change, who are the defenders of the status quo etc. A major British corporation chairman (name not given) quotes, *"I've never taken a major decision without consulting my colleagues. It would be unimaginable to me, unimaginable. First they help me make a better decision in most cases. Second, if they know about it and agree with it, they'll back it. Otherwise, they might challenge it, not openly, but subconsciously"*. (Thompson, A A. JR and Strickland, AJ. 1995)

2.7.8 Conclusion

Therefore in conclusion the politics of strategy centres around stimulating options, nurturing support for strong proposals and killing weak ones, guiding the formation of coalitions on particular issues and achieving consensus and commitment.

2.8 DECISION MAKING

2.8.1 Introduction

Decision-making can be **defined** as, *"The process of choosing one alternative from among a set of rational alternatives."*

Effective decision making, optimisers - profits, sales and employee satisfaction and **minimises** loss, expenses and employee turnover.

Whilst managerial decision making can be viewed essentially as an individual process, it is a process that takes place in an organisational context.

See, Figure 2-10, The Decision Making Tree.

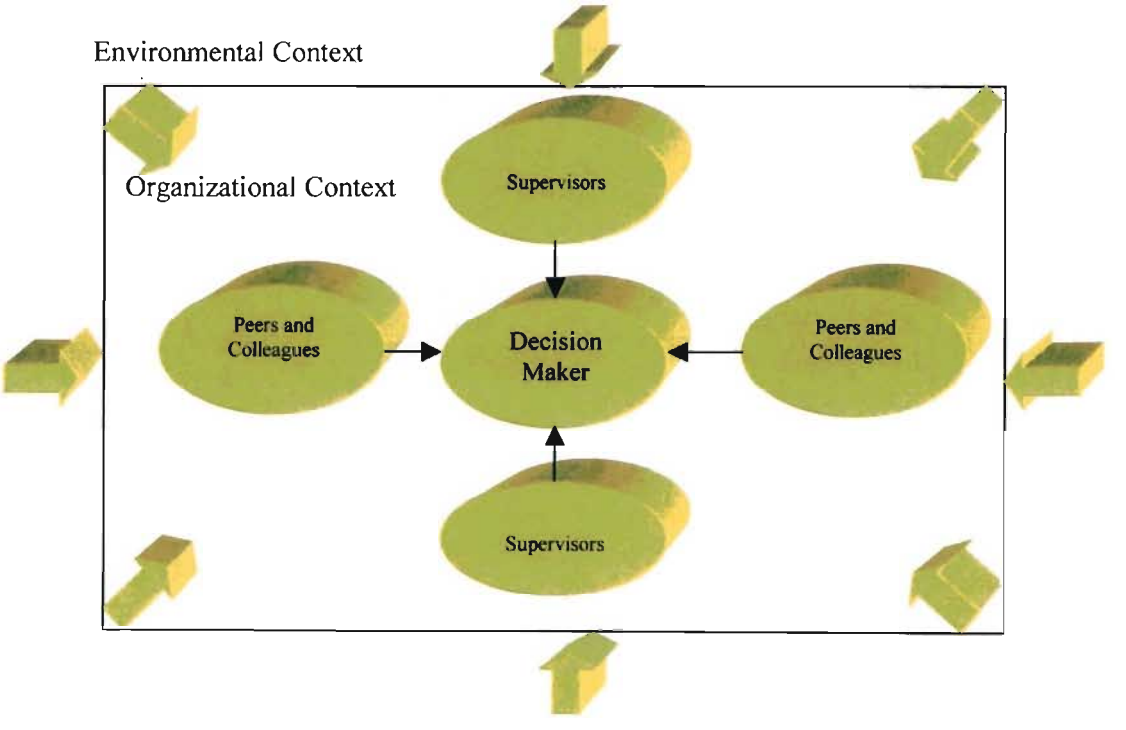


Figure 2-10, The Decision Making Tree
(Griffen, R. W. 1987.)

2.8.2 Managers make decisions under three conditions, "Certainty, Risk and Uncertainty".

2.8.2.1 Certainty.

They know the alternatives with conditions attached. Note, (Most of the significant decision making in contemporary organisations is done under a state of uncertainty.)

2.8.2.2 Risk.

They know the availability of each alternative and its payoffs and costs linked with estimates.

2.8.2.3 Uncertainty.

They do not know all the alternatives and risks attached or consequences. The key in uncertainty, decision making is to acquire as much relevant information as possible.

2.8.3 Decision Making.

Process of decision making can be split into eight sections:

1. Recognise the problem/situation
2. Define the problem
3. Set objectives
4. Develop alternative
5. Evaluate alternatives against objectives
6. Select best alternatives "tentative"
7. Assess decision for adverse consequences
8. Implement decision, follow up and evaluate

2.8.3.1 Recognise Problem.

A problem can represent a crisis or an opportunity.

2.8.3.2 Define Problem.

Look for the real problem no apparent problem. What happened, who is involved, where did it occur, when did it occur, and why did it occur.

2.8.3.3 Set Objectives.

Classify objectives into two categories, "Musts and Wants", Musts: Unless the objectives are met the problem will not be considered solved. Wants: Objectives are desirable outcomes but are not necessarily critical.

2.8.3.4 Develop Alternatives.

Develop a list of viable alternatives, obvious and creative.

2.8.3.5 Evaluate Alternatives.

Compare the strengths and weaknesses of each alternative. Each alternative is compared against each *must*, any alternative must meet all the *musts* to stay in contention. The remaining alternatives are then evaluated against the *wants*.

2.8.3.6 Select Best Alternative.

The best alternative will meet the *musts* and satisfy the *wants*.

2.8.3.7 Assess the Decision.

It must not result in a bigger problem for the future.

2.8.3.8 Implement, follow up and evaluate.

The implementation must be monitored and problems followed up. After implementation is complete the solution must be reviewed to determined if the original objectives have been achieved and the problem is solved.

2.8.4 Potential problem analysis

Can be split into seven sections:

1. What could go wrong?
2. What, specifically is each problem?
3. How risky is each potential problem?
4. What are the possible causes of each potential problem?
5. How probable is each possible cause?
6. How can a possible cause be prevented/minimised?
7. How can the most serious potential problem be handled?

2.8.4.1 What Could Go Wrong?

Think of all problems that may occur.

2.8.4.2 What, Specifically is Each Problem?

Analyse each potential problem for what it is, where it will occur, when and to what degree.

2.8.4.3 How Risky is Each Potential Problem?

Identify the potential problems that are the greatest risks. Ignore the potential problems that entail small risks.

2.8.4.4 What are the Possible Causes of Each Potential Problem?

List all the possible causes in a given problem drawing heavily upon judgement and experience.

2.8.4.5 How Probable is Each Possible Cause?

Rate each of the causes as to its probability of occurring. This will identify the causes, which should be given the most attention.

2.8.4.6 How Can a Possible Cause be Prevented/Minimised?

Each potential problem may have many possible causes. You need to apply several actions to prevent these causes or minimise the effects.

2.8.4.7 How Can the Most Serious Potential Problem be Handled?

Do not rely of preventative action's, prepare contingency actions to be adopted immediately.

2.8.5 Brainstorming

This is a method designed to encourage and support the free flow of ideas. There are four basic rules. Criticism is ruled out, freewheeling is welcomed, quantity is desired and building on other peoples ideas are encouraged.

Their rules are intended to keep; judgment apart from creative imagination as the two are incompatible. Ideally the group should consist of five to ten people, with each phase normally running for not less than twenty minutes or not longer than one hour.

2.8.6 How Decisions are Made in Practice

Spontaneously versus rational decisions.

2.8.6.1 Spontaneous Decisions

These are made with little conscious thought and are almost reflex actions. There is a natural tendency to use spontaneous decision making as it required little effort. Eg. "If it worked for us in the past it will be the right decision for today". Spontaneous decisions, however, have limitations due to the fact that circumstances are rarely identical. When managers confront new or important decisions they need to reason them out thoughtfully, rationally and logically.

2.8.6.2 Rational Decisions

This type of decision implies an objective and logical approach to decision making, and are based on a systematic study and logical analyses of a problem. It is furthermore a consistent approach and gives greater assurance of product results.

The skill of effective decision making can be improved by regular application of the sequential steps of the rational decision making process.

2.8.7 Decision making in practice

Decision making in practice can be split into three approaches:

1. The optimising approach
2. The satisficing approach
3. The irrational approach

2.8.7.1 Optimising Approach

The purpose is to maximise the outcome of the decision making and the sequential steps of the rational decision making process are applied.

2.8.7.2 Satisficing Approach

In contrast to the optimising approach, the following frequently apply in practice.

Incomplete information regarding the decision situation, incomplete information regarding all possible alternatives and the decision-makers are unable or unwilling, or both to fully anticipate the consequences of each available alternative.

Nobel prize winner, Herbert Simon, focused attention on two important concepts, "bounded rationality and satisficing".

Bounded rationality, specifically notes that decision-makers are not wholly rational - they are limited by their values, unconscious reflexes, skills, habits and less than complete information and knowledge.

Satisficing, rather than conducting an exhaustive search for the best possible alternative, decision-makers tend to search only until they identify an alternative that meets a minimum standard of sufficiency.

Reasons People Tend to Use the Satisficing Approach

They are unwilling to ignore their own motives and therefore are not able to continue searching beyond a minimally accepted alternative. They may be unable to weigh and evaluate large numbers of alternatives and criteria.

Subjective and personal considerations often intervene.

For these reasons the satisficing approach plays a major role in decision making.

2.8.7.3 Irrational Approach

This approach, which is also known as the "implicit favourite" approach, maintains that the decision is made prior to the search for alternatives.

When is this approach likely to be used? It is generally believed that unusual non-recurring decisions will lean towards this type of approach since, in dealing with new problems, managers do not have rules and guidelines to fall back on.

Also the more political the decision, the more likely that an irrational approach will be utilised.

Note: Decision-making research was based on notes issued by the University of the Witwatersrand, Johannesburg Faculty of Management Centre for Developing Business, dated March to June 1993.

2.8.8 Conclusion

In conclusion, the success of decision-making centres around three conditions, certainty, risk and uncertainty. It is thus very important to minimise the uncertainty and to reduce the risk factor as far as possible. It is further very important to understand all the criteria and advantages and disadvantages your decision may lead to.

2.9 CONCLUSION

Sections 2 to 4 looked at the Accredited Bodies, ISO 9000:2000 family and the Implementation of ISO 9001:2000. These can be considered to be the sections covering the "*harder issues.*" The harder issues can normally be described as the issues that can be measured and are objective. You can either achieve certification or not.

Sections 5 to 8 looked at Total Quality Management, Change Management, Organisational Culture and Decision Making. These in turn can be considered to be the sections covering the "*softer issues.*" The softer issues bring in the subjectivity, human involvement. This are can not be defined as black and white but rather as different shades of grey.

In conclusion it is very important not only to look at the hard facts but also to consider the softer issues. Of further importance is to ensure that all the role players are considered up front and to make them feel part of the process.

Chapter 3

RESEARCH DESIGN AND METHODOLOGIES

3.1 INTRODUCTION

Research Design and Methodologies for this research paper is based six sections, see Figure 3-1, Spray Diagram for the chapter

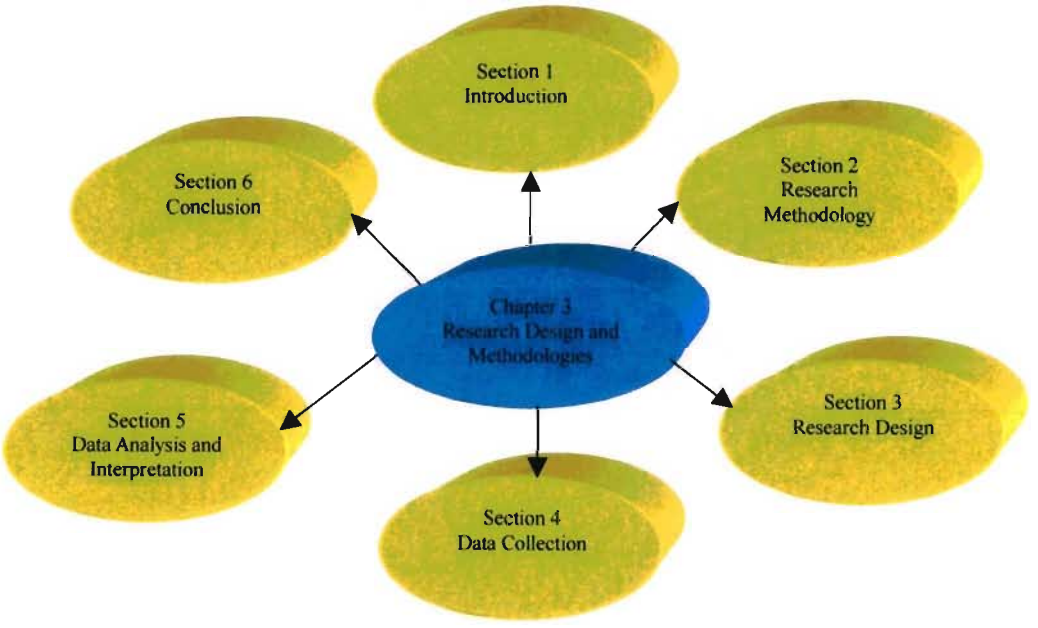


Figure 3-1, Spray Diagram for the chapter

The research paper was based on the design and implementation of ISO 9001:2000 within five of the eight sections currently in the Industry Association Resource Centre (IARC). The reason that only five out of the eight sections are included in this paper is the fact that three of them have already achieved ISO 9001:2000 certification. Certification for these three sections was achieved due to the fact that they were previously employed in the Resource and Strategy (R & S) Division and certification was a requirement. The original four sections of Distribution Technology (DT) ie, Power Plant, Control Plant, Engineering Processes and Technical Training and the newly acquired Pre-Paid Development now fall within the boundaries of R & S therefore the need for certification. Before research can be undertaken a problem has to exist.

> *"There are only two kinds of researchers those who have got problems and those who are going to have problems."*
> (Thomas, A. B. (2004)

According to Mouton, J. once the research problem has been formulated the next step is to select an appropriate research design. (2004)

Thomas states that there are two fundamental processes of research, these are describing and explaining phenomena. (2004)

Phillips and Pugh 2000 (as cited in Thomas, A.B 2004) describe this phase as *"intelligence gathering"*, the process of obtaining data in order to answer *"what"* questions.

The Research followed a specific route that was most suited to the problem. See, Figure 3-2, Research flow diagram

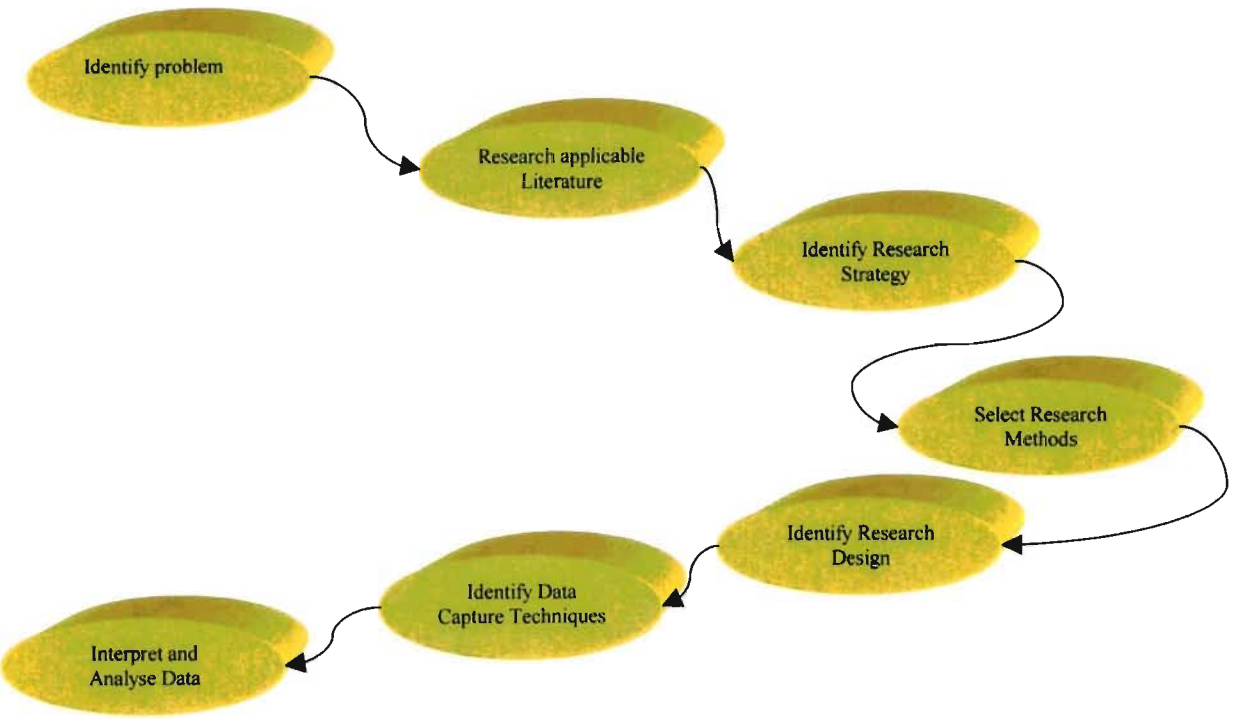


Figure 3-2, Research flow diagram

The research flow started off with the selection of a research problem as can be seen in Chapter 1. Once the research problem had been identified the next step in the flow was that of selecting the correct literature content to review that would help with the analysis of the research problem, this can be seen in Chapter 2. The literature review data was used as secondary data.

After pondering the question as which strategy should be followed and after reading numerous articles and books it was decided to make use of Action Research as a strategy, see, Table 3-1, association between disciplines, research strategies and research methods The book written by Thomas. A.B. (2004), was deemed to be the most suited book to base the research on.

The methodology followed was that of quantitative as well as a quantitative. The reason for both methods being used was that both the hard and soft issues were looked into.

Design was based on a gap analysis (hard issues) and interviews (soft issues)

The next step in the process flow was that of accumulating the data. This was achieved by observation by the researcher, carrying out a gap analysis and finally by interviews.

Once the data has been captured it then needs to be analysed and interpreted to ensure understanding of the captured data.

3.2 RESEARCH METHODOLOGY

Thomas, A.B. discusses five types of *research strategies* and then identifies which *discipline/field* and *research method* should be applied to each *strategy.* (2004). See Table 3-1, association between disciplines, research strategies and research methods.

Table 3-1, association between disciplines, research strategies and research methods

	Research Strategy				
	Experiment	*Survey*	*Case Study*	*Ethnography*	*Action Research*
Discipline/field					
Anthropology			✓	✓	
Psychology	✓				
Sociology		✓	✓	✓	
Management	✓	✓	✓	✓	✓
Research Method					
Sampling		✓			
Interview		✓	✓	✓	✓
Questionnaire		✓	✓		✓
Tests	✓				
Non-participant observation	✓		✓	✓	✓
Participant observation			✓	✓	✓
Documents, records			✓		✓
Quantitative analysis	✓	✓	✓		✓
Qualitative analysis			✓	✓	✓

The methodology followed for the research was ***qualitative and quantitative*** in nature and was based on six interviews and a gap analysis respectively.

The reasoning and motivation for using both methods is discussed in 3.2.3.

Interviews

Three were conducted with the sections within the Industry Association Resource Centre that already have attained ISO 9001:2000 certification, (Information Centre, Standardisation and ESI GIS). The other three were conducted with manufacturers that supply equipment to Distribution, (qualitative).

Gap analysis (questionnaire).

A gap analysis was undertaken at the start of the project to identify the perceived gaps between the current system and the proposed system, (quantitative).

> "*Once the researcher has decided to collect information/data through primary sources, s/he has to decide what kind .of data collection method to use.*"
> (Ghauri, P. and Grønhaug, K. 2002)

The primary data was acquired from semi structured interviews, questionnaires and workshops. The secondary data came from reports, books, journals and periodicals made available by the subjects of the literature review.

3.2.1 Qualitative Research Design

Qualitative research according to Patton, M.Q. *"transforms data into findings."* He however warns that there are no prescribed formulae that exists for that transformation. (2002).

According to Ghauri,P. & Grønhaug, K. a qualitative study *"data are attractive for many reasons: They are rich, full, earthly, holistic and real.* (2002). Becker, 1970; Miles and Huberman, 1994; Straus and Corbin, 1990 (as cited in Ghauri,P. & Grønhaug, K. 2002) are of the opinion that there are three major components of qualitative research;

"Data: often collected through interviews and observations.
Interpretive or analytical procedure: the techniques to conceptualise and analyse the data to arrive at findings or theories.

Report: written or verbal. In case of students, the report is written in the form of a thesis or project".

Qualitative data in conclusion can be viewed as very subjective in nature which can be interpreted differently by different people. This design can therefore be considered as "*Soft /Mess*" information and is subject to one's "*World view and Perspective*". Soft as explained by Broadbent, M. includes a large amount of human involvement, consists of relationships between people and involves problems of organisational structures. (2004)

3.2.2 Quantitative Research Design

"*Quantitative research is typically associated with the process of enumerative induction*". (Brannen, J. 1992)

Wagner (as cited in (Srivastava, U.K. Shenoy, G.V. and Sharma, S.C. 1994).has defined operations research as *"a scientific approach to solve problems for executive management."*

Quantitative data in conclusion can be viewed as objective in nature as it works on statistics. This design can therefore be considered as "*Hard / Difficulty*" information and is factual. Hard as explained by Broadbent, M. problem or opportunity is well defined and there is a lot of factual information.. (2004)

3.2.3 Mixing the methods: Quantitative and Qualitative research

Brannen. J. discusses mixing the methods, *"pre-eminence of the quantitative over the qualitative, pre-eminence of the qualitative over the quantitative and the qualitative and quantitative are given equal weight"*. (1992) The use of multiple methods *"triangulation"* is not an uncommon practice according to Brannen. There are however several factors that need consideration:

- Relative importance of each method within the overall project,
- Time ordering – extent to which methods are carried out consecutively or simultaneously,
- Stage in the research process where the respective methods come into play and
- Division of skills in research team,

(Brannen. J 1992)

When considering the above factors for this research paper, the factors were handled as follows. Both methods were given the same importance as they both complimented each other. The gap analysis was conducted firstly and then the interviews were conducted. The reason being that ISO 9001:2000 certification was a requirement and the gaps had to be identified first of all. At this stage the why and how was considered secondary. The gaps identified the areas that needed priority. The Work Group *"Research Team"* learnt along the way. The use of a consultant helped with the implementation strategy and was used tactically. My role in the team over and above helping with the implementation was that of the interviewer. Based on the literature available, our implementation process, the gap analysis and the information gathered from the interviews, an optimum implementation plan will be documented.

The research sought to identify, describe and evaluate the practices of the implementation of ISO 9001:2000 within the Industry Association Resource Centre. A qualitative and quantitative paradigm based on the writings of the authors above was therefore applied.

The reason being for both methods being adopted was that the quantitative method identified the so called "gaps" in the existing system and the qualitative method queried the reasons for ISO 9001:2000 certification and how the certification was achieved "process".

3.2.4 Research strategy

Action research as defined by Thomas *"means of integrating social science with social practice."* (2004) Thomas further states *"action research strategy is simultaneously to promote changes in organised social practices and to develop knowledge of these change processes and practices."*

An *"action research "* approach as seen in Table 3-1, association between disciplines, research strategies and research methods considered by Thomas as most suited for management studies was adopted (2004).Six interviews and a gap analysis were performed with the intention of creating a picture on how best to implement ISO 9001:2000.

Action research according O'Brein, R. *"requires the development of a cadre of people working in the field who accept the responsibilities of becoming co-researchers in the project."* (1998). This statement reinforces the decision to go with action research as a strategy as IARC have created a *"design team."*

As the paper was based on qualitative and quantitative studies the creation of the picture evolved around the characteristics associated with both methods:

- The data was empirical and both textual and numerical.
- Questions of why implementation was sought and how it was achieved were asked during informal interviews and then categorised into themes. (qualitative).

- A gap analysis was undertaken to hi light the gaps that were present between the current system an the proposed ISO QMS system. The information was in turn analysed and categorised into graphs. (quantitative.) a literature review of the relevant topics was undertaken both primary and secondary data were used

3.3 RESEARCH DESIGN

A research design according to Welman, J.C. and Kruger. S.J. "*is the plan according to which we obtain research participants (subjects) and collect information from them*".(2001)

The research design was based on the gap analysis and the six interviews of which three were held with the currently certified sections within IARC and other three were held with local manufacturers of electrical equipment.

Since the research papers objective was the development and implementation of ISO 9001:2000 within five of the sections in IARC and both the quantitative and qualitative methods were used sampling for both methods had to be considered.

Sampling was not considered for the gap analysis (quantitative method) as all employees forming part of the five sections had to complete the form. The reason for this was two fold, firstly the population number was approx 80 and the steering committee wanted to involve the entire group with the process.

However according to Welman, J.C. and Kruger. S.J. it is usually impractical and uneconomical to involve the entire population in research papers. They identify the entire population as "*N*" and the sample group as "*n*". Example the entire population "*N*" can be 1000 however the sample group "*n*" could be 100. (2001)

As with the gap analysis sampling was not considered for the three already certified sections within IARC. Sampling however had to be considered for the interviewing (qualitative) of the manufacturers. The sampling method chosen for the manufacturers was classified as "*probability, simple random samples*", (Welman, J.C. and Kruger. S.J. 2001)

All manufacturers that supply Distribution with equipment have to comply with a standard quality management system hence all manufacturers were considered to be equal when selecting them for interviews. Mouton. J supports the use of probability sampling when discussing content analysis. (2004)

All employees that form part of the five sections within IARC that have yet to achieve ISO 9001"2000 certification were requested to complete the gap analysis in order to help the implementation team to uncover the gaps between the existing system and the requirements of ISO.

The reason for splitting the interviews into two categories ie, IARC sections and manufacturers of electrical components were to get the perspectives from two different role players within the same electrical industry.

Ultimately it does not matter which side of the fence you find yourself in the industry the aim at the end of the day is to electrify the nation.

The IARC perspective was that of an organisation supplying the electrical industry with specifications in order to manufacture electrical equipment ie, Power Transformers, Switch gear and solidly formed moulded products.
The manufacturers perspective was that of supplying the electrical industry with equipment that complied fully with the specifications that enables a country to move forward. The choice of the manufacturers that were interviewed was random.

Whilst attending work group meetings and preparing for ISO 9001:2000 certification a literature review was undertaken in parallel with this activity. The objective of which was to gain knowledge from other organisations, and to incorporate theories and experiences of specialists in the different fields. The literature review was broadly based into two sections; quality management systems, accredited bodies, reasons for implementing ISO and finally implementation processes. The second section considered all the academic theories involved with the implementation of any new system.

3.4 DATA COLLECTION

3.4.1 Introduction

The data collection process was based on three methods:

1. Observation,
2. Gap Analysis and
3. Interviews

3.4.2 Observation

Bennett (as cited in Thomas. A.B. 2004) "*This is the most classical and natural of techniques. It simply involves looking at what is going on – watching and listening*". The aim of observing whilst working on the work groups and during training sessions was to identify the "*underlying assumptions*". (Broadbent. M. 2005) According to Broadbent. M. assumptions are a "*reference point*". (2005) In order to ensure successful implementation, the underlying assumptions of the staff need to be understood. This was achieved through observation.

As the strategy was based on "*action research*", the fact that an implementation work group was formed and that the implementation process involved the entire "*population* "*n* the data collection process for observation was based on an "*open participant observer*". According to Thomas. A.B. an "*an open participant observer takes a role within the organisation being studied but is known by everyone to be doing so as a researcher*".(2004) By using the term entire population meant that the entire IARC staff were observed and not just a sample few.

3.4.3 Gap analysis

The purpose of the gap analysis was to identify the gap between the existing system and the proposed ISO system. See Appendix 1, model gap analysis for IARC.

The gap analysis was only carried out after training of the staff was completed. The staff were informed as to the reason why they had to complete the gap analysis and how to complete it. All questions that were raised were answered during specific sessions. All the information from the gap analysis was consolidated and tabulated for use y the implementation work group.

3.4.4 Interviews

> "*Research interviews are concerned exclusively with obtaining data from respondents for research purposes.*"
> (Thomas. A.B. 2004.)

Although the interview schedule consisted of eleven different questions these questions can be categorised into two aspects, questions 1 – 4 covered the reasons as to "*why*" ISO and questions 5 – 11 covered the implementation process the "*how*" questions.

The purpose of the interviews was two fold;
Firstly to ask the interviewees the reasons as why ISO 9001:2000 was chosen above other QMS's and excellence models.

Secondly to identify the implementation process undertaken.

The interviews were loosely structured around the two key questions. The interview schedule was designed in such a manner that it had a number of prompts under each question to help the interviewee understand the questions. The interview schedule was sent to the various interviewees prior to the interview to allow for reflection. The interviews were conducted in the interviewees offices and were either the quality representative or the organisation manager deemed to be top management by ISO. The time span of the interviews was generally between one and one and a half hour. The interviewees were further informed that the interview information was to be used for a research paper in partial fulfilment for a masters degree.

See Appendix 2, model interview schedule for IARC.

3.5 DATA ANALYSIS AND INTERPRETATION

3.5.1 Introduction

Transforming data into findings according to Thomas, A.B. is not necessarily linked only to qualitative studies but also to quantitative studies. *"Whether quantitative in the form of numbers or qualitative in the form of words, "raw data" are reduced in various ways. Quantitative data are subjected to statistical analysis. Qualitative data are reduced by textual interpretation."* What can be deducted from the above statement is that qualitative studies in nature cover the softer (subjective) issues whilst quantitative studies cover the harder (objective) issues.

The secret however according to Thomas. A.B. when analysing any "*raw data*" is to make the data more intelligible but with as little loss of information as possible.

"There is no use looking for perfect interpretations of data: it would be terribly hard to find perfection if it were available, and it isn't."
Erickson and Nosanchuk (as cited in Thomas. A.B. 2004)

"Once we have collected the data we have to make sense of it"
(Welman, J.C. and Kruger. S.J 1992)

Due to the fact that both quantitative and qualitative methods were used, both had to be analysed using different techniques.

The quantitative data had to be sorted and the variables identified. Once the variables had been identified the level of measurement had to be determined. The items had to be coded in order to compare items from one gap analysis with the other gap analysis.

The qualitative data as with the quantitative data also had to be sorted. A content analysis method was undertaken in order to label items of data in order to compare all the items from one interview with the other interviews.

3.5.2 Quantitative analysis

The method deemed most suitable for the statistical analysis was "*Nominal-level variables*" Welman, J.C. and Kruger. S.J state that this approach be applied when people are classified "*into a set of mutually exclusive categories*".(1992) They go on to state further that all those in a particular category are alike with respect to the attribute being measured and those in different categories are different with respect to that attribute.

Thomas. A.B. is of the opinion that these variables only permit differences between cases to be identified. (2004)

The gap analysis questionnaires was structured along these guidelines. The participants were first of all asked whether they agreed with the question to be answered with a "*Yes or No*" answer. They were then requested if the answer was "*Yes*" to grade the level of maturity on a scale from 1 to 5. Level 1 being very mature and level 5 being in the infancy of maturity. They were further requested to comment on each question.

The answers were in turn tabulated and graphs depicting the answers were then generated. See Annexure 3, for model graph of ISO gap analysis for IARC.

Although the gap analysis had some subjectivity in the answers received from the respondents the collective answers were considered to be quantitative of nature. This is due to the fact that all the answers were categorised and the tabulated. The reason for the gap analysis was for assessing the maturity level of IARC in order to help the steering committee to structure the training required. If for example the maturity level was found to be very low the training would have had to be adopted to accommodate this. Fortunately due to the fact that IARC has to work according to the TESCO process their was some maturity within IARC.

3.5.3 Qualitative analysis

According to Thomas. A.B. the techniques used for interpreting textual material are more varied than those applied to quantitative data. He argues that unlike with statistical data where there are well understood procedures, there is less agreement on how texts can and should be analysed. (2004) "*...content analysis deals with the surface or manifest features of a text and involves classifying and quantifying its content.*" (Thomas .A.B 2004)

Welman, J.C. and Kruger. S.J (1992) and Thomas. A.B. (2004) both agree on the use of *"content analysis"* as a research technique to analyse and interpret field data collected. Field data collection can be in the form of a multitude of methods, the method used for this research paper took the form of loosely structured interviews.

The idea behind the interviews was to look for *"frequencies"* in the answers given by the interviewees. This was achieved by comparing the information collected from one interview and then comparing the same information from the other interviews.

The quantitative data was predominantly used for internal reasons as discussed above. The qualitative data was used with the secondary data to help with the research which was to develop and implement ISO 9001:2000.

3.5.4 Literature review

Literature review according to Thomas.A.B *"...is to establish the current state of knowledge in the field."* (2004) He further states that it provides a *"foundation"* for the main project. This is also supported by Mouton. J. *"... it is essential that every research project begins with a review of the existing literature."* He further states that there are two ways of looking at literature review, using it on it's own *"literature study"* or as the first phase of an empirical study. (2004)

The literature review conducted for this paper was an *"exploratory review"* (Thomas A.B. 2004) An exploratory review according to Thomas.A.B. *"...is intended to provide a broad appreciation of the content of the problem field. It involves a lets see what's out there approach ..."*

The objective of the literature review was that of incorporating the views, theories, practices and experiences of organisations, academia and subject matter experts. This process started off by researching accredited bodies, the ISO Quality Management System and in the implementing of ISO 9001:2000. When an organisation goes through change a number of underlying theories and themes need to be addressed as well. The literature review therefore covered the following areas of study:

An overview of Accredited Bodies was undertaken to ensure that the registrar selected for the certification was accredited to a national body that in turn had direct membership to an international authority.

As the research paper covered the development, implementation and certification of ISO 9001:2000 the standard had to be fully understood.

Organisations that had already achieved certification were researched with the reasons and benefits finally attained.

Once certification has been achieved, the next phase in the process is that of continual improvement therefore Total Quality Management was incorporated.

Any organisation that implements ISO needs to go through change, change management was therefore researched in order to see how it can be best implemented.

With change an organisation needs to understand the corporate as well as sectional culture instilled in the organisation.

Finally decision making was researched.

3.6 CONCLUSION

The research design and methodologies followed were of both the quantitative (gap analysis) as well as the qualitative (interviews) methods. The strategy adopted was that of action research.

All staff within the five uncertified sections of IARC completed the gap analysis, interviews were held with the three sections that had already achieved ISO certification. Interviews were also held with three manufacturers that had achieved ISO certification.

An extensive literature review was also undertaken to help with the understanding of the research problem. The following subject matter was researched in existing literature sources:

- Accredited Bodies,
- ISO Quality Management Systems specifically 9000:2000 series,
- Implementing ISO 9001:2000,
- Total Quality Management ,
- Change Management,
- Organisational Culture and
- Decision Making.

In conclusion an investigation of the literature was undertaken to determine the optimal implementation of ISO 9001:2000 within the Industry Association Resource centre.

Chapter 4

BODY OF KNOWLEDGE

4.1 INTRODUCTION

Body of Knowledge for this research paper is based five sections, see Figure 4-1, Spray Diagram for the chapter

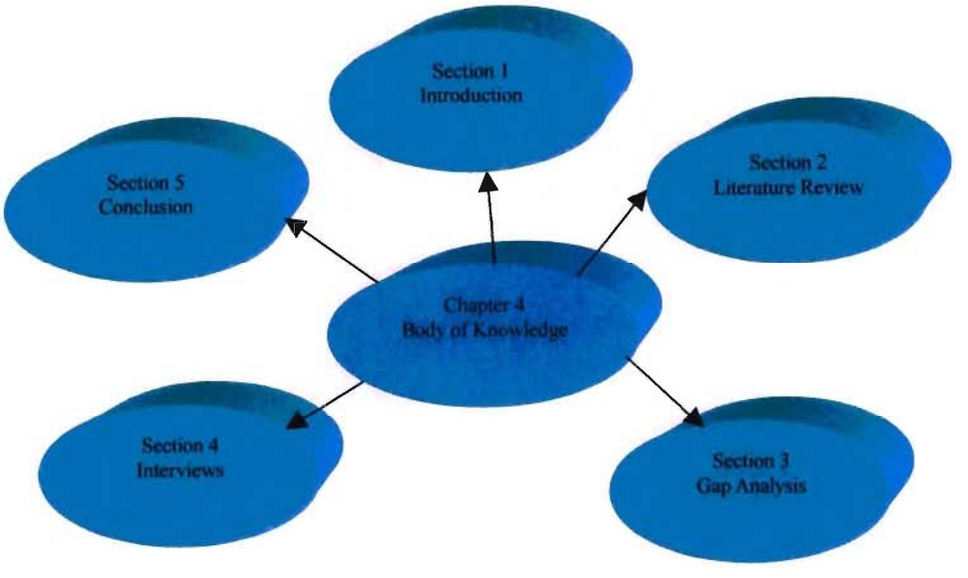


Figure 4-1, Spray Diagram for the chapter

This chapter deals with the analysis of the information gathered from the literature review, gap analysis and the interviews.

4.1.1 Literature review.

The literature review covered seven sections deemed to relevant to this research paper.

4.1.2 Gap analysis

The gap analysis involved all the staff within the five sections of IARC that form part of this research paper and was done to identify the so called "gaps" between the existing documentation system and that required by ISO 9001:2000.

4.1.3 Interviews

Interviews were held with the three sections in IARC that are currently ISO certified and with three manufacturers that are certified.

4.2 LITERATURE REVIEW

4.2.1 Accredited Bodies

SABS certification (PTY) Ltd was selected as the registrar that IARC will use to achieve ISO 9001:2000 certification. The decision was based on a number of criteria namely:

- Registrars link back to the IAF Inc via an accredited authority,
- Registrars knowledge of our business and
- Customer's knowledge of the registrar.

SABS certification (PTY) Ltd complied with all the above criteria deemed to be important for the selection of a registrar. IARC can therefore be confident with the certification achieved via the selected registrar.

4.2.2 ISO 9001:2000 certification

The ISO 9000 family is a system that is recognised and accepted world wide. ISO is further growing annually and acquiring new membership continually. Currently there appears to be no equal to ISO that is accepted world wide.

The European Union (EU) for example only want to deal with organisations that are ISO 9001:2000 certified. This trend is growing and organisations in various Countries can feel confident when acquiring products / services from organisations that are not situated in their own country. This is achieved via the Multi Lateral Agreement (MLA) that exists between it's accreditation body members.

The MLA ensures that all accreditation bodies linked to the IAF Inc accredit their members in a similar fashion, this in turn allows for consistency between the registrars.

4.2.3 Implementing ISO 9001:2000

The implementation of ISO 9001:2000 appears to have no given standard implementation process. The requirements for ISO 9001:2000 certification on the other hand are very clear and defined in ISO 9000, 9001 and 9004. ISO set out the frame work that is required for certification but do not state how this process should be carried out.

The amount of literature available for the actual implementation process is very limited. The implementation process for this research paper was therefore based on three articles.

There are however similarities between the three articles they all discuss a linear process and base it on a number of stages / steps. See Table 4-1, Implementation process showing number of stages / steps.

Table 4-1, Implementation process showing number of stages / steps

Author	Number of stages / steps	Linear
Peach. B. et al.,(2000)	Four stage approach	Yes
Murakami. R. (1994)	Five step approach	Yes
Kee-hung Lai. C. J. et al., (2001)	Ten step approach	Yes

Although all three work on a linear approach they all have different views of what should be done first. This cements the author's view that there is no consistent approach across the board.

Both, Peach. B. et al,.(2000) and Kee-hung Lai. C. J. et al,. (2001) for example agree on first obtaining management commitment, whereas Murakami. R. (1994) does not mention anything about management commitment in his implementation process.

Management commitment is vital to the success of ISO 9001:2000 certification and to it's on going success. This is due to the fact that management commitment ensures the establishment and maintenance of the quality policy and ensures that the quality objectives are driven throughout the entire organisation. It further ensures the availability of resources and reviews the Quality Management System (QMS) periodically.

All three however support the idea of creating a team to implement the system. Strangely, even though Murakami. R. (1994) supports this and refers to it as an "*internal task team*" he does not mention it in his implementation strategy.

Murakami, R. does not mention anything about continuous improvement once ISO 9001:2000 certification has been achieved. The other two have it in the process. (1994)

None of the three mention the use of an external consultant in there approaches, to help with the implementation process. Murakami. R. however supports the idea later his article but cautions on the selection. (1994)

A requirement by ISO for the organisation that is to be certified is the appointment of a "*management representative*". This however is not mentioned by any of them.

Finally none of the three articles, none of the interviewees and IARC did no prior research into the implementation process.

The process followed by IARC is very similar to the process as stated by Peach. B. et al., (2000).

4.2.4 Total Quality Management

> *"Total Quality Management (TQM) is a philosophy, a way of thinking and working that is concerned with meeting the needs and expectations of customers. It attempts to move the focus of quality away from being a purely operations activity into a major concern for the whole organisation.*
> *Through TQM, quality becomes the responsibility of all parts, departments and sections in the organisation. Further, it is the responsibility of all people in an organisation. It is concerned with reducing all of the costs of quality, in particular failure costs. TQM also espouses the process of continuous improvement".*
> (Pycraft. M. et al., 1997.)

Total quality management can be defined as "*consistent conformance to customers' expectations*" (Pycraft. M. et al., 1997.).

The organisation must know there customers' expectations, values and believes, a successful organisation will know what its customers' expectations are. It is useless putting a quality system into place that looks after costs, training, motivating people and so on if the customers' requirements are not achieved. An important point to remember is that marketing has to understand the ability of the organisation. It does not help if the Marketing Department promise a customer that his product will be ready in six months, when it can only be physically ready in twelve months. TQM further highlighted the fact that one has to, "*See things from a customer's point of view*".

A good example of a company commitment to customer satisfaction, is Guardian National, "*one of our corporate values is quality in everything we do*". (Pycraft. M. et al., 1997.)

> "*For an organisation to be truly effective, every single part of it, each department, each activity, and each person and each level, must work properly together, because every person and every activity affects and in turn is affected by others*".
> (Pycraft. M. et al., 1997.)

It is very important to realise that customers are not only external to an organisation but also internal to it. Control Plant is a customer to Power Plant. Power Plant provides a service to Engineering Processes in the form of detailed designs, drawings, scope of works etc. Errors in the internal service's provided will eventually filter down to the external customer, "*end user*". By ensuring that all the IARC internal customers receive a quality service /product will ultimately ensure that the external customer's needs are met and exceeded. Within a macro operation, i.e. the compiling of a specification one has a number of micro operations that influence that specification. See Figure 4-2 , Input Output Transformation Process

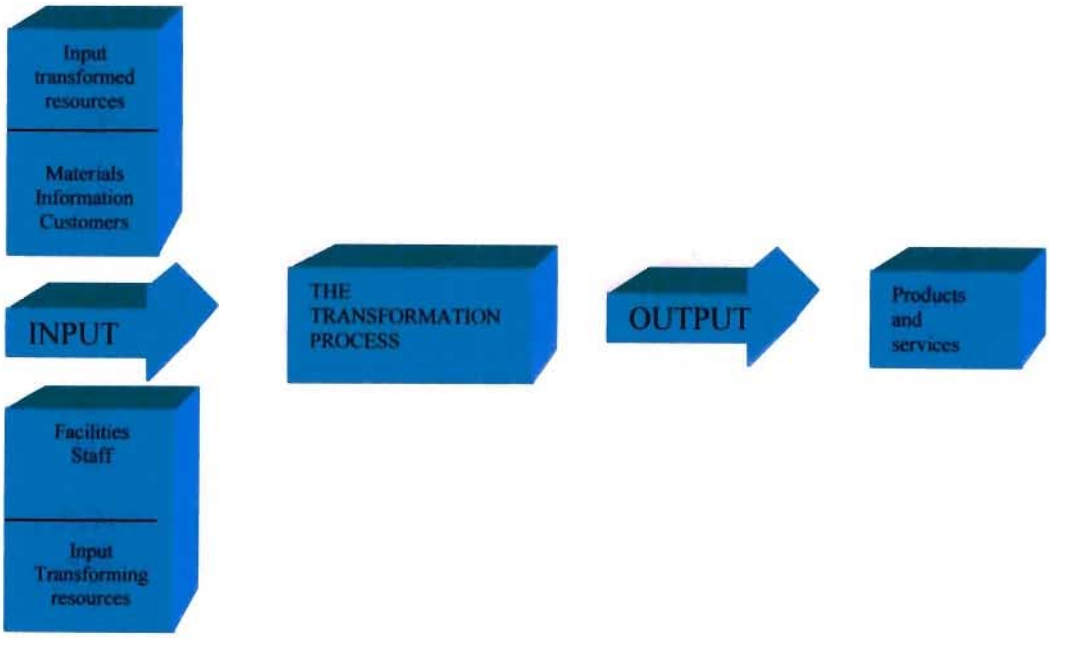


Figure 4-2 , Input Output Transformation Process

"*Total Quality Management is sometimes referred to as quality at source*".
(Pycraft. M. et al. 1997.)

This defines quality as everybody's responsibility, from the people who compile the product to the people who talk to the customer. Each and every person in an organisation is responsible for quality. Thus if everybody has the ability to impair quality, then they also have the ability to improve quality, if only by not making mistakes.

If the drawings completed by the draughtsman is error free, the chances of building the substation incorrectly are reduced and visa versa. It is thus very important that every person in IARC, understands their influences of quality and accepts the responsibility that goes with quality. For example, if one of the forms lacks information on and the decision-maker does not know this, he could then make the wrong decision. It is very important to realise that employees are the most valuable intellectual and creative resource.

By achieving customer satisfaction is not enough and one cannot become complacent. An organisation must continually look into bettering it's existing product, "Continuous Improvement, Kaizen" be it cost, quality of supply, lead times etc. A happy customer is a customer that will come back and support you. On attaining customer satisfaction will lead to market share improvement ultimately. The bigger the market, the higher the chances are of the organisation going into the future and expanding.

In a TQM organisation, performance is based on the never ending ideal of continuous improvement.

4.2.5 Change Management

Why is there a need to change? Work is continuously being identified and completed throughout IARC, in fact throughout the entire world. What can IARC gain from change? In Chapter 1, the problem statement was highlighted, but should it be considered as important?

The answer to the question is most definitely yes, yes, yes, it should be considered extremely important. Porter (as cited in Thompson, JR &, A.A, Strickland, AJ. 1995) , "*How competitive forces shape strategy*", clearly shows that we live in a dynamic world.

As can be seen from figure 2.7 there are a number of factors influencing business and IARC is by no means immune to this syndrome. Currently in the industry there are a number of competitors, "Consultants etc" competing for a market share.

It is furthermore influenced by the suppliers of key components. The larger manufacturing companies, ie "ABB, Alstom, Reyrolle, etc" that currently supply Distribution with components are pushing for full "Turn Key Projects". This implies that they no longer only want to supply components that go into a system, but would rather design, project manage, supply the components and commission the system.

Buyers have an influence as well, as they want a good quality of supply with a low initial capital outlay. They are currently pushing this extremely hard, thus putting pressure on IARC to supply what they want.

As can be seen from the above a number of factors are influencing change, and thus IARC needs to, "*ride the wave or sink*". Customer's requirements change continually thus the organisation needs to change to satisfy the customers requirements and to be competitive in an ever growing industry. As the saying goes, "*adapt or die*"

4.2.5.1 Change Management skills

Wille. E. and Hodgson. P. *"One cannot manage change if one cannot manage anything. There are a number of skills required in managing change"* (1991) They propose six skills as listed below:

1. Reframing,
2. Zooming,
3. Networking,
4. Parallel working,
5. Harnessing conflict and
6. Idea connections

4.2.5.1.1 Reframing

Reframing is to put in an existing idea into a new context or framework. One has to think of turning problems into opportunities. Jan Carlson Chief Executive of Scandinavian Airlines inverted the classic structure of the hierarchy and put himself at the bottom, thus showing that he supported the managers and customer contact staff.

Reframing seems to have" great potential benefits in that it opens up opportunities. As they saying goes "*don't look at the hole in the doughnut but rather look at the dough around the hole*" **(Seeing existing things in a new way).**

4.2.5.1.2 Zooming

Zooming "*By taking a helicopter view*", in other words a wider perspective, "*removing the blinkers and thinking laterally"* is not always good enough. Occasionally one needs to zoom in and look at the detail to check if it fits in with the company plan. A hotel manager for example may wish to change the market his hotel operates in, by zooming precisely what impression the arriving guest has of the hotel, what does the lobby look like etc.

(Dropping in close to detail but not staying there).

4.2.5.1.3 Networking

Networking Informal versus formal communication. People tend to believe in rumours, gossip and idle communication, "*Informal Communication*" as opposed to office memos, notices and videos, "*Formal Communication*". Creating and networking, in networks is a skill for which some people have more aptitude than others".

(Using informal communication to find out what is really happening and to enable you to harness the ideas of others.)

4.2.5.1.4 Parallel Working

Parallel Working Finding ways of operating on several fronts at once. One will further have to cross functional and professional boundaries.

(Being able to hold several threads in your hands at once).

4.2.5.1.5 Harnessing Conflict

Harnessing Conflict If someone disagrees, it is possible that they care about the outcome, maybe they disagree on the methods used. By harvesting the extra energy one has an extra recruit to the campaign.

(Mobilising its energy instead of running away from it).

4.2.5.1.6 Idea Connecting

Idea Connecting Joining ideas together that are floating around the company. In this way a new or improved product or process can emerge. Whoever introduced Mr Rolls to Mr Royce was probably not aware what a significant combination the two men would become.

(Bring together part-ideas from diverse sources to make new whole ones).

4.2.5.2 Conclusion

It is important to note that at this point change does just not happen it has to be managed and directed. It further needs a plan to worked on. The above are but a few skills required to help with the change management process as seen from the perspective of Wille. E. and Hodgson. P. (1991)

According to Sweet, M. when asked about the lessons learnt along the way he had the following to say, "*Anybody who is going to do this has to accept the fact everything is open to change.*" He goes on further to state, "*Making and organisation better means changing it.*"(1999)

For IARC to remain competitive in the industry today with the threat of new entrants it has embrace change with open arms. In doing so will prevent stagnation.

4.2.6 Corporate Culture

Corporate culture plays an important role when an organisation is going through change. Does the culture allow for quick and immediate acceptance to change? or will there be obstacles created?

Is there a link between culture and ISO 9000 certification? According to Mallak et al (as cited in Yeung, A C L. et al,. 2003) there appears to be a link. They developed an instrument for the organisational culture in ISO 9000 certified firms and subsequently identified 16 "*cultural factors*" of organisations. "Cultural *factors*" being; "*decisive, team orientated, risk averse, valuing stability, paying attention to details and valuing high levels of organisations…*"

Based on the above there definitely appears to be a relationship between ISO certified firms and culture. When analysing the so called "cultural factors" as developed by Mallak et al,. all are of a positive nature and should help to retain customers by ensuring customer satisfaction.

When looking at culture from a different point of view, Shih, Li C. and Gurani, H. in there studies found that it is not only culture that plays an important role when implementing a Quality Management System (QMS) (1997) They found that of equal importance to culture playing a key role in any quality management activities was the organisational and technical components of the QMS.

They quote an example, without a proper set of coherent and integrated tools and methods it remains impossible for even the most motivated team to improve there working methods and quality.

Now let us focus on Japanese Quality Management Systems (JQMS) there are a number of myths surrounding the quality of Japanese products as opposed to there Western counterparts. It has always been argued that the Japanese are a quality oriented nation and that it is inbred. For the purposes of this research paper the author will concentrate on two points.

Firstly let us examine the quality between so called "*transplanted Japanese companies*" (Shih, Li C. and Gurani, H 1997) "*Transplanted companies*" means that they are sister companies in the same organisation but one is situated in Japan and the other outside of Japan.

In this case the management styles differ, the companies in Japan according to Shih, Li C. and Gurani, H enjoy much more generous profit sharing than foreign employees. They further enjoy improved career opportunities with company growth owing to the practice of a more stricter closed-career system in Japan. (1997)

Secondly Japanese organisations work on the famous "*muri and muda*" principle, a compromise between capital and labour. Management promise not to make "*muri na*" unreasonable demands and the workers promise to do their best to eliminate "*muda*" waste. (Shih, Li C. and Gurani, H. 1997)

From the above it can be seen that culture does play a role in the success of an organisations QMS. It must however be noted that culture in isolation will not be as effective if implemented without the correct organisational tools.

Finally JQMS cannot be compared with the Western style of QMS due to the different management styles.

4.2.7 Decision Making

Within IARC there will be choices that need to be made. These choices will be presented to the various sections at all stages of the process. The decisions that are made should be in line with the customer's needs and requirements. Unfortunately this does not always happen and choices are made in an unstructured way often yielding products that are not optimal. To ensure that rational choices are made a rational decision-making process needs to be followed.

In the making of any decisions, there will always be a number of factors that will influence the final decision. As with Griffens Decision Making Context, there are numerous other examples of ensuring that one considers all the options when making a decision. Broadbent, M. 2005-1likens it to driving a car. She talks about three views; Front, Back and Sides. See Figure 4-3 , Decision Making Multiple Cause Diagram

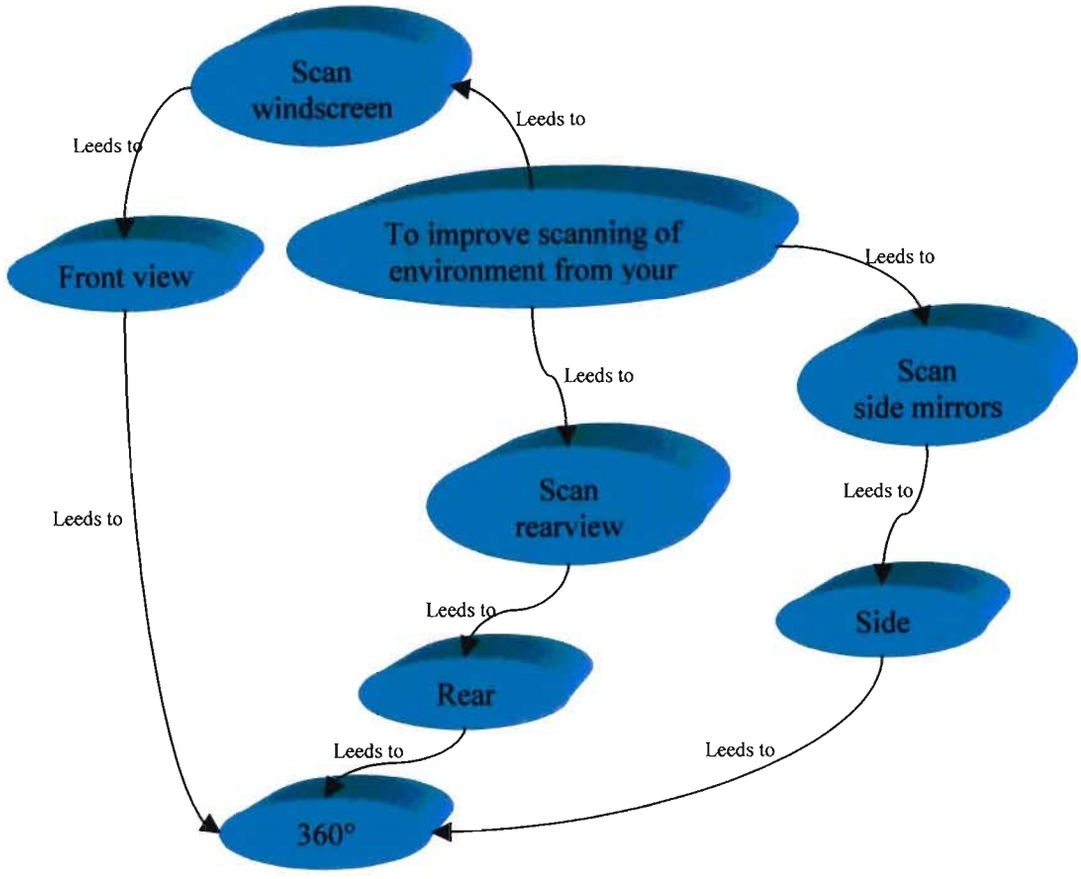


Figure 4-3 , Decision Making Multiple Cause Diagram

What does Broadbent. M. imply with this diagram. Let's put this in context first of all, consider yourself driving along the freeway and wanting to change lanes.

Suppose the side and back windows are blacked out and that the only view one has is the wind screen, what type of decision can be made? Changing lanes would be highly dangerous as one would not know if there was traffic behind or along side. Not a good time to change lanes. Now picture the view as the side windows and mirrors become available for use then the rear window and mirror. What is happening here is that as more views become available it becomes safer to change lanes.

Now what has this got to do with decision making within the context of your organisation. Well it is pretty simple, the more information that one has at the time will lead to better decisions being made.

Managers make decisions under three conditions, "Certainty, Risk and Uncertainty".

Certainty, they know the alternatives with conditions attached. Note, (Most of the significant decision making in contemporary organisations is done under a state of uncertainty.)

Risk, they know the availability of each alternative and its payoffs and costs linked with estimates.

Uncertainty, they do not know all the alternatives and risks attached or consequences. The key in uncertainty, decision making is to acquire as much relevant information as possible.

NOTE: It is very important to remember that, "*the implications for the customer are considered in corporate decision making and that decisions are made and systems created that will not detract from the customer's experience*".
(Pycraft. M. et al. 1997.)

4.3 GAP ANALYSIS

Now that the literature analysis is complete it is time to look at the gap analysis. The gap analysis used was the standard gap analysis as proposed in ISO 9004:2000.

> *"Self-assessment is a carefully considered evaluation resulting in an opinion or judgement of the effectiveness and efficiency of the organisation and the maturity of the quality management system."*
> ISO 9004:2000

The main purpose of the gap analysis "*self-assessment*" as I see it then is to help an organisation identify the areas that need work. The benefit is that the organisation can then concentrate its resources on the areas that need improvement. It is also to provide fact-based guidance to the organisation regarding where to invest those resources for its improvement.

For the performance maturity levels used in this self-assessment approach see Table 4-2 , Performance maturity levels

Table 4-2 , Performance maturity levels

ISO 9004:2000

Maturity level	Performance level	Guidance
1	No formal approach	No systematic approach evident, no results, poor results or unpredictable results.
2	Reactive approach	Problem or corrective –based systematic approach, minimum data on improvement results available.
3	Stable formal system approach	Systematic process-based approach, early stage of systematic improvements; data available on conformance to objectives and existence of improvement trends
4	Continual improvement emphasized	Improvement process in use; good results and sustained improvement trends.
5	Best-in-class performance	Strongly integrated improvement process, best-in-class benchmarked results demonstrated

The ISO 9004:2000 self-assessment approach is to evaluate the maturity of the quality of the quality management system for each major clause in ISO 9001 on a scale ranging from 1 (no formal system) to 5 (best-in-class performance). This annex provides guidance in the form of typical questions that the organisation can ask in order to evaluate its performance for each of the main clauses in ISO 9001.

> *"The self-assessment approach describes the intent to provide a simple, easy-to-use approach to determining the relative degree of maturity of an organisation's quality management system and to identify the main areas for improvement.*

Specific features of the ISO 9004 self-assessment approach are that it can:

- *be applied to the entire quality management system, or to a part of the quality management system, or to any process,*
- *be applied to the entire organisation or part of the organisation,*
- *be completed quickly using internal resources,*
- *be completed by a multi-discipline team, or by one person in the organisation who is supported by top management,*
- *form an input to a more comprehensive management system self-assessment process,*
- *identify and facilitate the prioritisation of opportunities for improvement and*
- *facilitate maturing of the quality management system towards world-class performance.*

ISO 9004:2000

It must however be realised that this process does not substitute the internal audit for the quality management system.

Another advantage to this approach is that results monitored over time can be used to appraise the maturity of an organisation.

When analysing the bullets as proposed by ISO 9004:2000 the following can be deducted for the IARC process.

It was applied to the entire quality management system and to the five sections that require ISO certification. It was completed using internal resources no consultant appointed at this stage. The team was multi disciplinary and it hi-lighted the areas that needed priority. Finally it was instrumental in the maturing of the quality management system.

The gap analysis consists of 27 major questions with the sub clause numbers linked to the questions. Sixteen of the major questions have sub questions linked to them which in turn brings the total number of questions to be answered to 52 questions.

All the questionnaires were analysed and graphs were drawn up for each question representing the total answers given. This was captured at both departmental (IARC as a whole) level as well as each section within IARC, resulting in seven graphs per question. The reason for having seven graphs and not six is that the admin staff from the sections had there own graph.

All the graphs are available in Annexure B of the DT Pre-paid Development ISO 9001:2000 gap analysis (not attached due to the length of the document).

All the graphs for question 1 are shown below. The author felt it to be of value to show the typical graphs for question 1 depicting the answers according to five sections and admin's perspectives and then combining them. This serves as illustrative for the other graphs.

See Table 4-3 , Control Plant Technologies Plant Graph
See Table 4-4 , Engineering Processes Graph
See .Table 4-5 , Pre-Paid Development Graph
See Table 4-6 , Power Plant Technologies Graph
See Table 4-7 , Technical Training Graph
See Table 4-8 , Admin Graph
See Table 4-9 , IARC Department Graph

Table 4-3 , Control Plant Technologies Plant Graph

Question 1: Managing systems and processes (4.1)

a) Does management apply the process approach to achieve the effective and efficient control of processes, resulting in performance improvement?

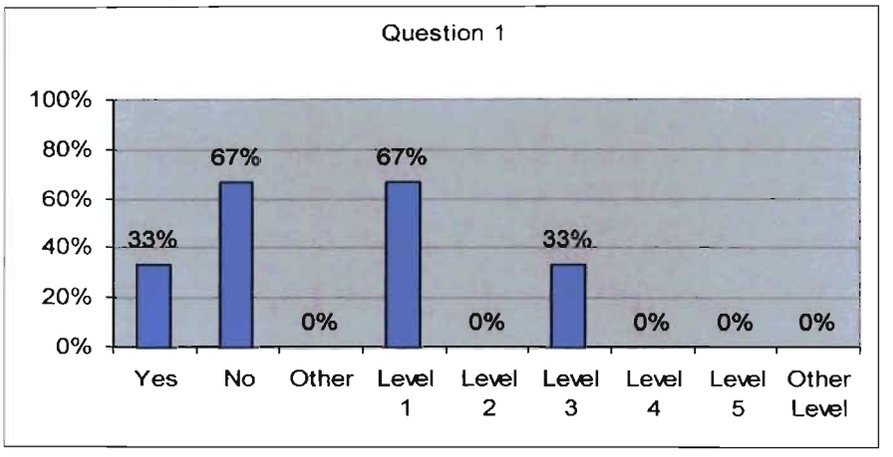


Table 4-4 , Engineering Processes Graph

Question 1: Managing systems and processes (4.1)

a) Does management apply the process approach to achieve the effective and efficient control of processes, resulting in performance improvement?

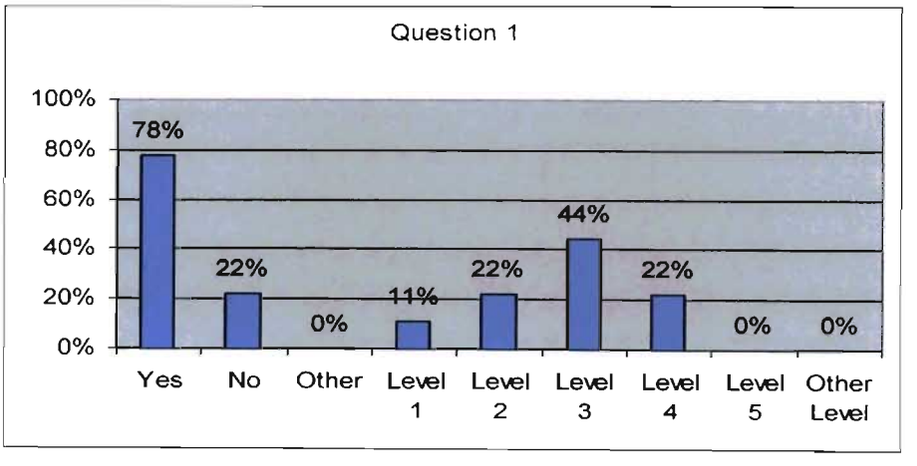


Table 4-5 , Pre-Paid Development Graph

Question 1: Managing systems and processes (4.1)

a) Does management apply the process approach to achieve the effective and efficient control of processes, resulting in performance improvement?

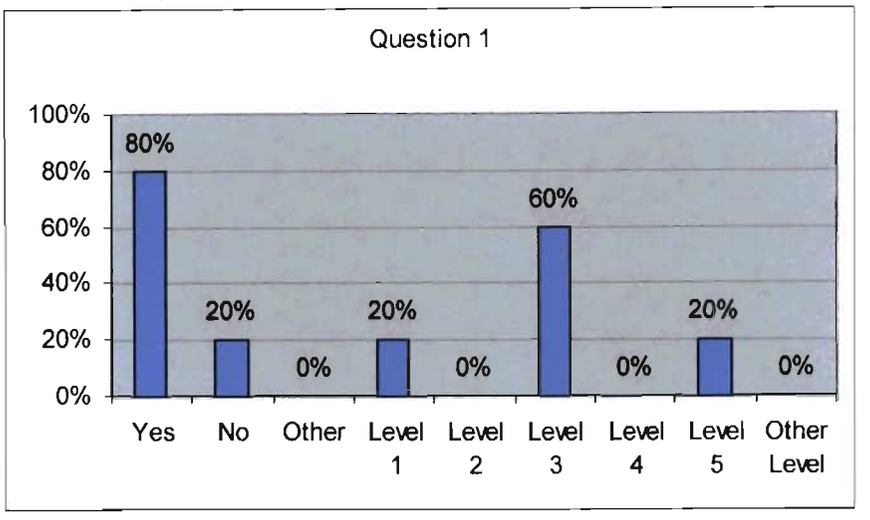


Table 4-6 , Power Plant Technologies Graph

Question 1: Managing systems and processes (4.1)

a) Does management apply the process approach to achieve the effective and efficient control of processes, resulting in performance improvement?

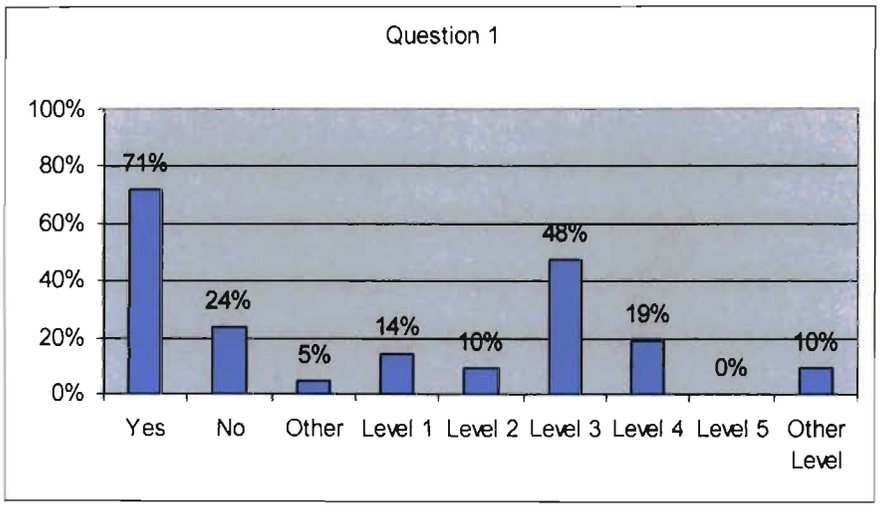


Table 4-7 , Technical Training Graph

Question 1: Managing systems and processes (4.1)

a) Does management apply the process approach to achieve the effective and efficient control of processes, resulting in performance improvement?

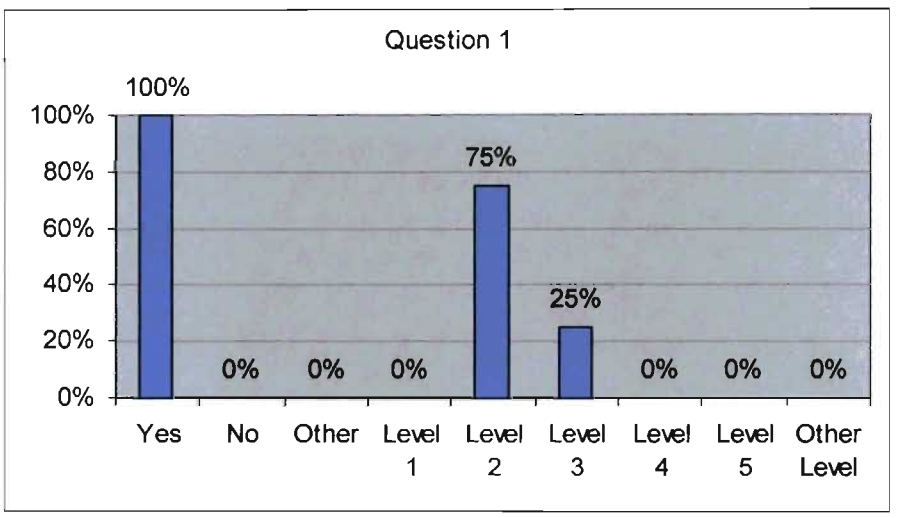


Table 4-8 , Admin Graph

Question 1: Managing systems and processes (4.1)

a) Does management apply the process approach to achieve the effective and efficient control of processes, resulting in performance improvement?

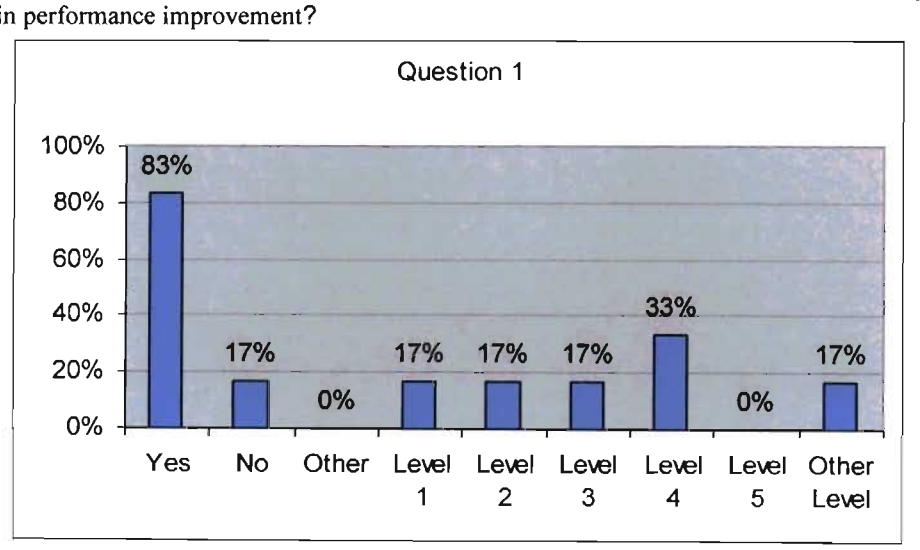
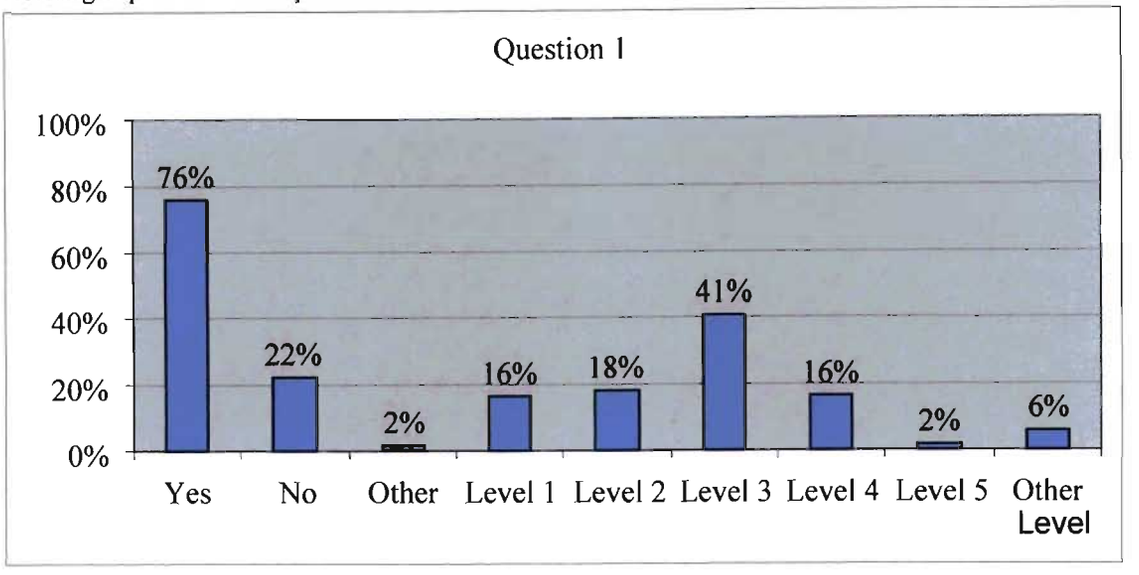


Table 4-9 , IARC Department Graph

Question 1: Managing systems and processes (4.1)

a) Does management apply the process approach to achieve the effective and efficient control of processes, resulting in performance improvement?



For the percentage of staff that replied per section see Table 4-10 , Section Staff replies

Table 4-10 , Section Staff replies

Section	Number of staff	Replies received	Percentage
Management	1	1	100%
Control Plant Technologies	9	3	34%
Engineering Processes	15	7	46%
Pre-Paid Development	8	5	63%
Power Plant Technologies	26	23	88%
Technical Training	9	4	44%
Admin	10	6	60%
Consultant	1	-	-
IARC	79	49	62%

Admin were grouped separately from their sections due to the fact that they had their own cost centre. This was purely for financial reasons only.

The ten Admin staff were made up as follows; seven Power Plant Technologies, two Engineering Processes and one Technical Training. The six that completed the gap analysis under Admin all fell under the Power Plant Technologies section.

When bringing in the Admin staff and adding them in turn to the Power Plant Technologies section the percentage remains 88% i.e. (29/33* 100) If the others had to be added to their sections it would decrease the percentages shown in Table 4-10 , Section Staff replies

An interesting observation made whilst looking at the amount of respondents per section is the number of Power Plant Technologies replies as apposed to the other sections. The fact that the Power Plant Technologies Manager is the appointed Management Representative for the ISO 9001:2000 certification process may have had an influence. This however can be disputed due to the fact that the staff in the Power Plant Technologies are more adaptable to new ideas than the other sections. This can be seen in the correspondence received generally on the implementation of any other new ideas.

Based on the completed gap analysis specific action plans with priorities have been identified in order to implement ISO 9001:2000 see Table 4-11 , Implementation Matrix

Table 4-11 , Implementation Matrix

Clause number	Gap	Action	Priority
4.1. 5.5.1 5.6.1	ARIS modelling to be completed inclusive of organisational structures, RACI and job descriptions.	Business planning and goal setting	High
4.2.	Document management procedure required. Develop Web/Server based document system	Document management	Medium
5.2	Formal customer approach needs to be developed including record keeping.	Customer management and Service Level Agreement	Medium
5.3.	Quality policy needs to be defined	Quality policy required.	High
5.4.	Improved business planning process and methodology (including resources)	Business planning and goal setting	High
5.5.2.	Formally appoint the management representative.	Appoint Management Representative	High
5.5.3	Formal internal communication process required.	Business Process Mapping	Medium
5.6	Review process to be developed and implemented.	Business Process Mapping	Medium
6.3	Building and facility maintenance plan is required.	Infrastructure	Medium
6.3	Determine IT plan with responsibility.	Infrastructure	Medium
6.5	Knowledge management system is required.	Business Process Mapping	Low

The above matrix based on the gap analysis was created to hi-light the identified gaps to enable the steering committee to take the required action. It further attempted to determine the relative degree of maturity of IARC's quality management system and identified the areas to concentrate on, ie the lack of a quality policy. The quality policy currently forms part of the management system manual but will be re-positioned in to its own policy document later.

This process was conducted over a period of three day's, reason being that IARC has offices throughout the country with the head office located at Simmerpan Germiston. Sessions were held at Simmerpan, Eskom College Midrand and Cape Town to encourage participation. Each workshop had representation by the steering committee to help staff with the completion of the self assessments. This was to eliminate any confusion in the answering of the questions and to ensure that the questions were answered the same. The steering committee members that facilitated the sessions were involved with the compilation of the gap analysis.

The total number of staff members that completed the gap analysis was 49, total staff members in IARC is 79. (49/79*100) equates to 62% of the staff members. This percentage was deemed to be adequate to find the gaps by the steering committee. It was the opinion of the steering committee that the information would not have changed with a higher percentage of replies.

After discussing the results between the steering committee members all agreed that if the steering committee alone had completed the gap analysis the results would have been very similar. The reason for this statement is the fact that IARC currently work according to the TESCOD process which is shown in Appendix 3. The major similarity between the requirements of ISO 9001:2000 and the TESCOD process is that both require a high level of maturity and both are process based.

4.4 INTERVIEWS

Six loosely structured interviews were held, three were held with the previously certified sections that now formed part of IARC and three were held with manufacturers that supply the industry with equipment.

Although the interview schedule consisted of eleven different questions these questions can be categorised into two aspects, questions 1 – 4 covered the reasons as to "*why*" ISO and questions 5 – 11 covered the implementation process the "*how*" questions.

In chapter 2 the question of "*why*" was researched and "*what*" motivates organisations to achieve ISO 9001:2000 certification. The "*implementation process*" was also researched to try and uncover if their was any standard method being used in the certification process. The interviews were of a similar structure. It has to be remembered though that the articles and interviews can be deemed as being subjective as the answers largely depend on ones perspective. For example does one see the hole in the donut or the actual doe that makes up the donut.

As discussed previously the interviews held were loosely structured and formatted in such a way as to get as much out of the interview as possible. All answers received were continuously questioned with prompts by the interviewer to ensure that the interviewee understood the question. The interviewer continuously attempted to raise the underlying assumptions of the interviewee.

All the interviewees both internal to IARC and external were informed of the purpose of the interviews and were further told that the interviews in turn would be used as information for this research project. All agreed that the information gathered in the interviews could be used.

It is not the intention of the author to link answers to names or to identify the manufacturers interviewed. The data gathered will be analysed per question or set of questions thereof and documented purely for information purposes only and thus the interviewees will remain anonymous.

4.4.1 Internal Interviews

For the interview schedule showing the relevant sections interviewed, Interviewee, Date and venue see Table 4-12 , Internal Interview Schedule.

Table 4-12 , Internal Interview Schedule

Section	Interviewee	Date	Venue
ESI-GIS	Section Manager	27 July 2005	Eskom College Midrand ESI-GIS Offices
Standardisation	Management Representative	29 July 2005	Simmerpan Germiston Interviewers Office
Information Centre	Section Manager	01 August 2005	Megawatt Park Sandton Information Centre Offices

The motivation for the three sections becoming ISO 9001:2000 certified was driven from the top. ie Eskom executive management. Eskom is currently involved in a huge drive for the divisions to achieve ISO certification. None of the participants were actively aware of any other excellence models.

Two of the interviewees stated that they did expect to realise benefits, those being standardisation in processes which would make it easier for new staff coming in to the sections. They further talked about knowledge management that would help them make fact based decisions. One of the interviewees originally perceived certification as a "*hassle*" that was purely done for compact purposes only.

All agreed that projects and or complaints were handled more efficiently due to the process being documented and standardised. Another benefit was the fact that a process was documented once and then used continuously. There was however a perception by one of the interviewees that paper work had increased.

Now then to the actual implementation process. The questions were drawn up specifically to see how they implemented the process with the idea behind the questioning to try and see if their was any correlation between them. The author also tried to establish how much research they had done prior to the certification process.

All three appointed management representatives and fully supported them during the process. The management representatives were further appointed in writing.

They further all appointed ISO consultants to help with the implementation process.

Two of the three used the consultants tactically on an, as and when required basis. The consultant was not used with the training and the implementation process. This is the recommended usage of a consultant as researched in chapter one. One of the sections however appointed the consultant in a strategic fashion and thus the consultant formed part of the implementation process and training process. According to the research done in chapter one this is the un-preferred method of appointment. All three however seem to be operating very similar and there appears to be no difference in the sections quality management systems.

Thus based on the above it looks like the consultant could be used tactically or strategically in this context. It must however be noted that the situation could change if the context was different.

One of the sections did not do a gap analysis. The process followed by each department was not uniform and thus no correlation can be made. When asked what process did they follow the answer generally was based around the ISO process. Now then the answer was interesting as ISO does not propose an implementation process. The author therefore can feel pretty confident in stating that no prior research was done by the three sections. This is evident in the answers given by the interviewees.

All three of the sections made use of the services of SABS Certification (PTY) Ltd as their registrar to achieve ISO 9001:2000 certification. The reason for there decision was based on the fact that SABS had been busy in the other R & S sections. Standardisation and the Information Centre have close work ties with SABS and this further cemented there decision. SABS further used the same auditor for the certification process for the three sections.

One of the section managers and a number of staff members from the three sections are of the opinion that all registrars are not equal. This statement is a contradiction to the Multi Lateral Agreement that exists between peer accreditor's of the International Accreditation Forum Inc. This would be a good subject for a different research paper.
Each of the three sections had different implementation time frames see Table 4-13 , Implementation Time Frame

Table 4-13 , Implementation Time Frame

Section	Number of staff	Auditor	Consultant used	Time frame
ESI-GIS	9	SABS	Tactically	18 Months
Standardisation	8	SABS	Tactically	24 Months
Information Centre	17	SABS	Strategically	16 Months

Murakami. R. supports the services of a consultant and states that they can save an organisation time and money. (1994)

Hughes, T. Williams, T. & Ryall, P. caution the use of a consultant, mentioning that the consultant should be used from a tactical rather than a strategic perspective. (2000)

Both the above articles support the use of a consultant with the implementation this is further supported by the three sections in Table 4-13 , Implementation Time Frame. Hughes, T. et al., however are of the opinion that they should be used "*tactically*" and not "*strategically*". Now what do they mean by "*tactically / strategically*" (2000)

My understanding of the above is, sure make use of a consultant but do not let the consultant be the driver of change this must come from within the organisation it self. The consultant is only involved with the creation of the documents and helping with the internal auditing. This implies using the consultant "*tactically*".

Now then what is the difference when using the consultant "*strategically*". Over and above helping with the documentation and internal auditing the consultant gets involved with the actual training and change. Basically as I see it the consultant is an additional Management Representative.

How did the different use of a consultant have an affect on the three sections listed in Table 4-13 , Implementation Time Frame? All three sections had a different implementation time frame, the difference between ESI-GIS and the Information however was only two months. ESI-GIS however only have half the staff of the Information Centre i.e. nine versus seventeen, could this have made a difference then? I believe that it did not.

My reasoning for the statement is that it is part of a Librarians culture to document everything, which is in line with the requirements of ISO 9001. This fact is according to the section manager of the Information Centre. Now then, can the shorter time frame only be contributed to the strategic use of the consultant? Based on the comment from the Information Centre section manager I believe not. It would be very interesting doing a case study on an organisation that does not document everything and then to see if the use of a consultant strategically would help in shortening the implementation time frame.

When looking at the costs of the consultants used in the three sections above ESI-GIS and Standardisations costs equate to roughly 10% of the costs incurred by the Information Centre. Therefore based on the above I support the work done by (Hughes, T. et al., 2000).

All three sections had formal training sessions usually one day sessions. The biggest hurdle to over come according to one of the management representatives was the issue of responsibility and whose system it was. Once the staff became aware that quality was not only the responsibility of the management representative but the responsibility of each and every individual, their attitude changed.

Another obstacle was the fact that staff perceived it to be a management tool that management could use as a "*big stick*" to punish them. Again training helped to overcome this fear.

Finally all three agreed on yes when asked the question, "*Would you implement ISO 9001:2000 in hind sight.*" They further all agreed that they would implement ISO whether their customers required it or not. One of the sections that was most hesitant in the beginning and looked at the certification purely as a hassle went through a 180° change. The sections opinion had changed from a definite NO to a most definite YES.

4.4.2 External Interviews

For the interview schedule showing the relevant sections interviewed, Interviewee, Date and venue see Table 4-14 , External Interview Schedule

Table 4-14 , External Interview Schedule

Section	Interviewee	Date	Venue
Manufacturer 1	General Manager	25 July 2005	Manufacturer 1 offices
Manufacturer 2	General Manager / Management Representative	25 July 2005	Manufacturer 2 offices
Manufacturer 3	Technical / Director Representative	19 September 2005	Manufacturer 3 offices

The motivation for the three manufacturers becoming ISO 9001:2000 certified was driven from externally i.e. their customers of which Eskom Distribution is one of the three's major customers. It must however be pointed out that all three manufacturers have been certified for many a year. All three have been certified as follows;

- SABS 0157,
- ISO 9001:1987,
- ISO 9001:1994 and
- ISO 9001:2000.

As with one of the three sections one of the manufacturers (manufacturer one) deemed certification to be a punishment. SABS 0157 certification was based in the "*apartheid era*" where there were no opportunities for exporting hence the reply to the question.
SABS 0157 was a locally based Quality Management System used prior to the establishment of ISO. An interesting observation with this same manufacturer (manufacturer one) is the fact the General Manager as well as five of his senior management were in the employ of this organisation at the time of SABS 0157 certification.

The perceived benefits of the other two manufacturers were basically the same as for the three internal sections as shown above.

The actual benefits seen by manufacturer one is that ISO 9001:1994 enabled this manufacturer to export up into Kenya. The other two manufacturers also export to various countries i.e. Australia, Malaysia etc. This according to them would not have been achievable without ISO certification.

A further benefit achieved by all three manufacturers is the documentation of procedures, where it was previously done in an uncontrolled manor it now has been formalised. It has further improved customer satisfaction both internally and externally this can largely be attributed to standardisation.

ISO certification according to manufacturer one also helps to break down trade barriers between countries.

Manufacturers two and three state that re-work has decreased. Manufacturer three states that their re-work has brought down their scrapping of material from 8% to 2%, they are however aiming for a 1% level of scrap due to re-work. Manufacturer three are further moving to a electronic order system.

Now then to the actual implementation process. As with the three sections the questions were drawn up specifically to see how they implemented the process with the idea behind the questioning to try and see if there was any correlation between them. The author also tried to establish how much research they had done prior to the certification process.

At this point the author would like to point out the one major difference between the three internal sections and the three manufacturers. The three internal sections had no previous certification experience whilst the three manufacturers have been involved for years.

All three appointed management representatives and fully supported them during the process. The management representatives were further appointed in writing.

They further all appointed ISO consultants to help with the implementation process.

One of the three used the consultant tactically on an, as and when required basis. The consultant was not used with the training and the implementation process. This is the recommended usage of a consultant as researched in chapter one.

None of the manufacturers did a gap analysis. Fortunately all three had previously obtained ISO 9001:1994 certification and only had to update their policy manuals. The biggest challenge according to manufacturer one was the wording of the documents. This is due to the fact that the majority of employees speak Afrikaans and the documentation had to be worded in such a manner to allow the employees to understand the requirements.

As with the three internal sections the process followed by each department was not uniform and thus no correlation can be made. When asked what process did they follow the answer generally was based around the ISO process. Now then the answer was interesting as ISO does not propose an implementation process. The author therefore can feel pretty confident in stating that no prior research was done by the three sections. This is evident in the answers given by the interviewees.

Manufacturers one and two made use of the services of SABS Certification (PTY) Ltd as their registrar to achieve ISO 9001:2000 certification. The reason for there decision was based on the fact that SABS had certified them previously and they wanted to retain consistency. Manufacturer three used BSI as their certifying body due to the fact that 70% of their work was for export. This is in line with what Murrakami, R. states. He is of the opinion that your customers must be able to recognise your registrar and have faith in your certification. (1994)

Now then the Multi Lateral Agreement is yet again in the spot light.

Each of the three manufacturers had different implementation time frames see Table 4-15 , Implementation Time Frame

Table 4-15 , Implementation Time Frame

Section	Number of staff	Auditor	Consultant used	Time frame
Manufacturer one	170	SABS	No	18 Months
Manufacturer two	440	SABS	No	6 Months
Manufacturer three	50	BSI	Tactically	4 Months

The excuse offered by manufacturer one for their long lead time for the change over from ISO 9001:1994 to ISO 9001:2000 certification is that it was done on a part time basis. This however does not hold water for me as all three had to go through the change over. What it does tell me however is that manufacturer two and three have a higher commitment.

Due to the fact that the three manufacturers had implemented ISO 9001 previously no major training was undertaken. Manufacturer two however compiled a document out lining the differences between the 1994 version and the 2000 version. It was further compulsory for all staff to attend and sessions were arranged by the management representative and fully supported by the general manager.

As with the three sections all three agreed on yes when asked the question, "*Would you implement ISO 9001:2000 in hind sight.*" They further all agreed that they would implement ISO whether their customers required it or not. All three manufacturers use their certification on all marketing and tender documentation.

4.5 CONCLUSION

In conclusion ISO appears to be universally accepted standard that has a structure in place which is further linked to the International Accreditation Forum Inc. Their however is no generally accepted implementation process laid out. ISO 9001:2000 certification is the first phase in the Quality Management System the real benefits come with the implementation of quality management. Change management, corporate culture and Decision making were also analysed. An interesting observation found is the general misunderstanding of the Japanese Quality Management System.

Due to the fact that the Industry Association Resource Centre had implemented the TESCOD process years ago the gaps found between the existing system and the requirements of ISO did not cause major problems.

The interviews also hi-lighted the fact that no formal implementation process exists for ISO 9001:2000 certification. A further fact that was identified is the opinion that all registrars are not deemed to be equal.

Chapter 5

FINDINGS AND RECCOMENDATIONS

5.1 INTRODUCTION

Body of Knowledge for this research paper is based four sections, see Figure 5-1, Spray Diagram for the chapter

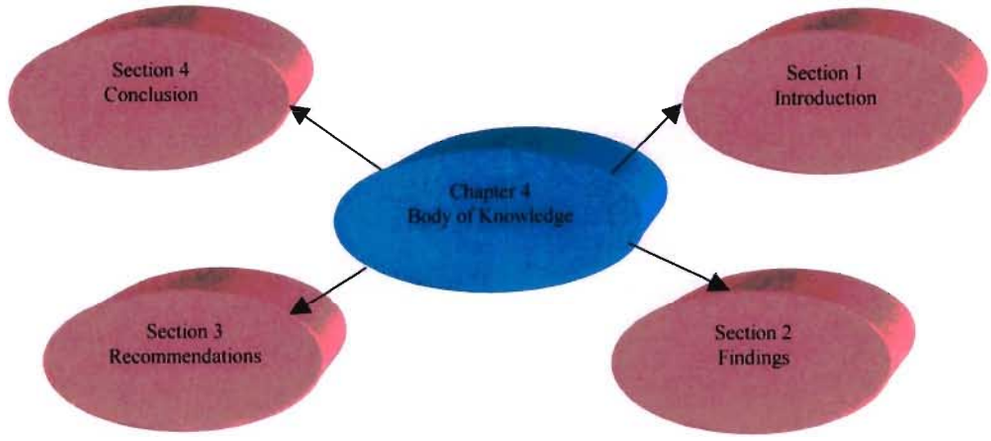


Figure 5-1, Spray Diagram for the chapter

This chapter deals with the findings of the information gathered from the literature review, gap analysis, the interviews and finally the process followed by IARC and then the proposed recommendations for future implementation.

5.2 FINDINGS

The Literature Review, Interviews and the research in the NEXUS data base study identified the fact that little if nothing has been researched in the optimal ISO 9001:2000 certification process flow. See Table 5-1, IARC Implementation Matrix versus the other three.

Table 5-1, IARC Implementation Matrix versus the other three.

Process Flow	IARC	Peach. B. et al..(2000)	Murakami. R. (1994)	Kee-hung Lai. C. J. et al.. (2001)
Top Management Commitment	1	1		1
Appoint Management Rep	2			
Establish Steering Committee	3	2		2
Train Steering Committee	4	3		
Perform GAP analysis	5			
Map Process	6		3	
Create Management System Architecture	7			
Appoint document Work Group	8	*		
Appoint Management System Specialist	9	5		
Document Management System	10	6	1	3
Implement Management System	11			
Prepare for Certification **	12	4	2	
Clear Findings and Improve Management System	13	7		
Certification Audit	14	8	4	
Clear Findings and achieve Certification	15	9	5	
Maintenance and Continual Improvement	16	10	6	4

Note 1, * = Supports the use of a consultant but does not mention it in his implementation process.
Note 2, ** = two activities being done in parallel, Internal Audit and Registrar Readiness Assessment

The idea behind this matrix is to hi-light the discrepancies between the process undertaken by IARC and the processes undertaken / proposed by other the three. The process flow in the first column is the process followed by IARC to date.

The activity sequence has been subsequently found to be not optimal. Although the other three have a number of other activities in the process flow not shown these were left out on purpose to try and get some understanding between IARC activities and theirs.

Based on the above and the information gathered through the interviews their appears to be no universally accepted process flow in the certification process flow. The three articles researched, the six interviews conducted and the IARC implementation process identified this short coming.

None of the parties involved did any research into other organisations that had gone through the process prior to them to try and establish a optimal implementation process. What is truly amazing is the fact that ISO 9001:2000 certification does not come cheaply but no one bothers to investigate to see if there are success stories and then to base their strategy on that case study.

After analysing the IARC process that was followed a number of short comings were found. See Table 5-2, IARC Process flow with Supporting Factors and Problems Identified

Table 5-2, IARC Process flow with Supporting Factors and Problems Identified

Process Flow	Supporting Factors	Problems Identified
Steering Committee	Top Management Support. Buy in from all sections. Appointment of Management Representative. Perform GAP analysis.	No thought given to Steering Committee member appointments. No research undertaken. *
Management Representative	Supported by Top Management	
GAP analysis	Supported by Steering Committee	
Map Process		No methodology agreed upon up front. First system attempted far to complex for ISO certification. **
QMS Architecture		Initial approach did not work.
Appoint Work Group	Supported by Steering Committee	Appointed to late
Appoint Management System Specialist	Supported by Steering Committee Identified process owners Process mapped and documented Formalised the QMS.	
Implementation	Training sessions undertaken	Not enough active interventions held. ***
Internal Audit.	System Documented	System not implemented
Registrar Readiness Audit	System Documented	System not implemented

Note 1, * = The appointment of the Steering Committee was done on a hap hazard basis with little thought of the expertise required. This can be seen in the fact that no research was carried out to try and determine a optimal implementation process.
Note 2, ** = Eskom uses the ARIS methodology for process mapping. This is an internationally accepted system that is very complex in fact far to complex for the requirements of ISO. A lot of time was wasted during this activity due to very poor project planning. The system eventually used is Visio a Micro Soft system that is adequate for the management system.
Note 3, *** = All the staff members are highly qualified and motivated individuals that perform their daily duties without any problems. They all understand the TESCOD process and therefore do not need any training in the TESCOD process. The problem arose when the Steering Committee treated the implementation process similar to that of the TESCOD process. The assumption was treat both processes the same, big mistake the processes are very different.

Originally the documents that were required were given to various staff members to compile. This however did not prove to be successful as all the staff members have their normal duties to fulfil.

The documentation was only completed after the establishment of the Work Group. The Work Group would break away on a Tuesday and Wednesday to compile the required documentation.

Proper project planning was found to be lacking and this caused major delays in the implementation process.
Conversation Personal, Bekker, A. and Clark, C.B. 28 October 2005.

5.3 RECOMMENDATIONS

5.3.1 Moving from Tri-angle Pyramid.

As can be seen from the problem statement, this research paper has two phases, designing and implementing then sustaining the system.

Due to the fact that this research paper has all the requirements of a project i.e. start / end date, is unique, has mile stones etc, it therefore should be treated as such. Most if not all of project management professionals such as Kerzner, H. PhD. and Burke, R. all discuss the three basic dimensions of a project; *"Time, Cost and Quality."* These dimensions are good for the first phase, *"what happens once the project has been completed?"* (second phase.) Most have never put much thought into the next phase the maintainability / sustainability of the project.

Rwelamila, P.D. PhD. however does consider another dimension, when he discusses going from a *"tri-angle to a pyramid"* (2005). Rwelamila, is of the opinion that a project needs a fourth dimension, *"utility."* See Figure 5-2, Moving from Tri-angle to Pyramid.

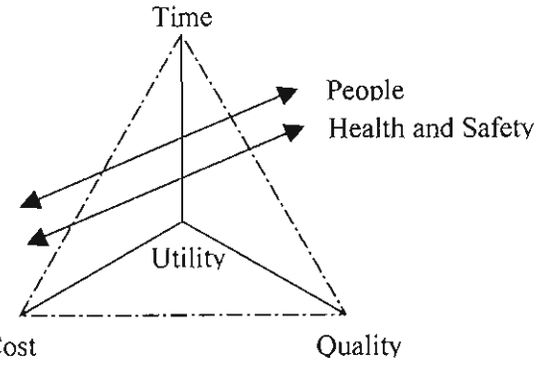


Figure 5-2, Moving from Tri-angle to Pyramid.
Rwelamila, P.D. PhD. (2005)

"Now then how does this fourth dimension have a bearing on this research paper or any other project for that matter?" IARC can achieve ISO certification within Time, Cost and Quality but that does not necessarily mean that utility will be realised. It is critical for utility of the system to be considered. This is due to the fact that certification is only the first phase, continuous improvement is the next phase that never ends and this can only be proved successful if the system is sustained through utility. All organisations that achieve ISO 9001:2000 certification are continually assessed and can loose their certification. This happens when the registrar has proof that the system is not maintained as documented and continual improvement is lacking. Due to this it is of the utmost importance that utility is considered when implementing a QMS.

5.3.2 Proposed ISO 9001:2000 implementation process flow.

As can be seen from the above there is no universally accepted ISO 9001:2000 certification implementation process flow. The process followed by IARC (which was found to be lacking in a number of areas) is totally different to that followed by the other three processes. After analysing the information at hand and after experiencing the implementation process first hand a recommended process will now be proposed.

The recommended process was based on the experience gained during the implementation process within IARC and the available literature at the time. The changed activities are as follows:

- Repositioned activities,
- Redefined and repositioned activities and
- Redefined activities and
- New activities.

These activities will be shown in different colours to help make the reading of the process easier. See Figure 5-3A Existing process 5-3B Recommended process.

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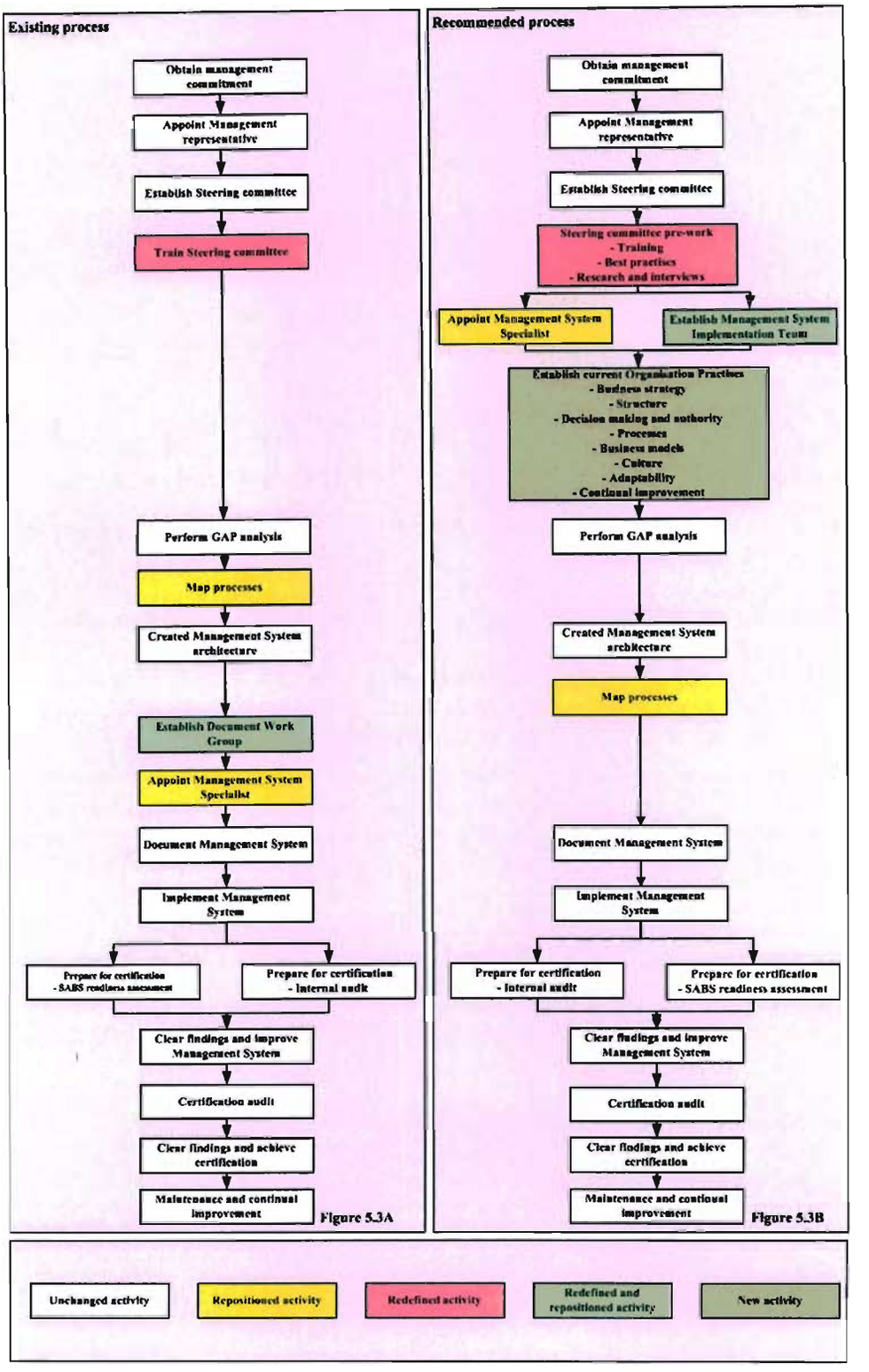

Figure 5-3A Existing process 5-3B Recommended process

Conversation Personal, Bekker, A. / Clark, C.B. 28 October 2005.

It is proposed that the recommended process be named the Bekker and Clark ISO 9001:2000 certification model implementation process.

It is further proposed to split the Bekker and Clark process into four stages namely:

- Stage 1, Planning for certification,
- Stage 2, Documentation required for certification,
- Stage 3, Experience certification and
- Stage 4, Maintain and continually improve system.

5.3.2.1 Stage 1.

- Obtain Management Commitment,
- Appoint Management Representative, (Ensure that the correct individuals are appointed.)
- Establish Steering Committee,
- Steering Committee pre-work'
- Appoint Management System Specialist and Establish Management System Implementation Team.

5.3.2.2 Stage 2.

- Establish current Organisation Practices,
- Perform GAP analysis,
- Create Management System Architecture,
- Map processes,
- Document Management System and
- Implement Management System.

5.3.2.3 Stage 3.

- Prepare for certification; Internal Audit and Registrar Readiness Assessment,
- Clear findings and Improve Management System,
- Certification Audit and
- Clear findings and achieve certification.

5.3.2.4 Stage 4.

- Maintenance and Continual Improvement.

5.4 CONCLUSION

The importance of a fourth dimension "*Utility*" was discussed over and above the three normal dimensions of a project namely; "*Time, Cost and Quality.*"

Due to the fact that no universally accepted ISO 9001:2000 certification implementation process exists a new process is recommended. The recommended process consists of four stages and is based on the IARC existing process. The major changes occurring in the first two stages where activities were repositioned, redefined, redefined and repositioned and finally a new activity was added.

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APPENDIX 1

The award models as well as other self-assessment models have a wide range of detailed criteria for assessing the performance of management systems. Self-assessment provides an easy approach for evaluating the maturity of an organization based on clauses 4 to 8 of this International Standard. Each organization should develop a set of questions for those clauses of this International Standard that are suitable to its needs. Examples of typical questions for self-assessment are provided below. The sub-clause numbers are given in parentheses.

NOTE 1: Please give brief, concise answers to ALL questions.

NOTE 2: Rate the Maturity Level you estimate DT to be for each question.

Question 1: Managing systems and processes (4.1)		**Maturity Level**
a) How does management apply the process approach to achieve the effective and efficient control of processes, resulting in performance improvement?		
Question 2: Documentation (4.2)		
a) How are documents and records used to support effective and efficient operation of the processes of the organization?		
Question 3: Management responsibility — General guidance (5.1)		
a) How does top management demonstrate its leadership, commitment and involvement?		
Question 4: Needs and expectations of interested parties (5.2)		
a) How does the organization identify customers' needs and expectations on a continual basis?		
b) How does the organization identify people's need for recognition, work satisfaction, competence and personal development?		
c) How does the organization consider the potential benefits of establishing partnerships with its suppliers?		

d) How does the organization identify other interested parties' needs and expectations that can result in setting objectives?		
e) How does the organization ensure that statutory and regulatory requirements have been considered?		
Question 5: Quality policy (5.3)		
a) How does the quality policy ensure that the needs and expectations of customers and other interested parties are understood?		
b) How does the quality policy lead to visible and expected improvements?		
c) How does the quality policy consider the organization's vision of the future?		
Question 6: Planning (5.4)		
a) How do the objectives translate the quality policy into measurable goals?		
b) How are the objectives deployed to each management level to assure individual contribution to achievement?		
c) How does management ensure the availability of resources needed to meet the objectives?		
Question 7: Responsibility, authority and communication (5.5)		
a) How does top management ensure that responsibilities are established and communicated to people in the organization?		
b) How does communicating quality requirements, objectives and accomplishments contribute to improvement of the organization's performance?		
Question 8: Management review (5.6)		
a) How does top management ensure valid input information is available for the management review?		

b) How does the management review activity evaluate information to improve the effectiveness and efficiency of the processes of the organization?		
Question 9: Resource management — General guidance (6.1)		
a) How does top management plan for resources to be available in a timely manner?		
Question 10: People (6.2)		
a) How does management promote involvement and support of people for improvement of the effectiveness and efficiency of the organization?		
b) How does management ensure that the competence of people in the organization is adequate for current and future needs?		
Question 11: Infrastructure (6.3)		
a) How does management ensure that the infrastructure is appropriate for the achievement of the objectives of the organization?		
b) How does management consider environmental issues associated with the infrastructure?		
Question 12: Work environment (6.4)		
a) How does management ensure that the work environment promotes motivation, satisfaction, development and performance of people in the organization?		
Question 13: Information (6.5)		
a) How does management ensure that appropriate information is easily available for fact-based decision making?		
Question 14: Suppliers and partnerships (6.6)		
a) How does management involve suppliers in the identification of purchasing needs and joint strategy development?		
b) How does management promote partnership arrangements with suppliers?		

Question 15: Natural resources (6.7)		
a) How does the organization ensure the availability of necessary natural resources for its realization processes?		
Question 16: Financial resources (6.8)		
a) How does management plan, provide, control and monitor the financial resources necessary to maintain an effective and efficient quality management system and to ensure the achievement of the objectives of the organization?		
b) How does management ensure awareness of people in the organization about the link between product quality and costs?		
Question 17: Product realization — General guidance (7.1)		
a) How does top management apply the process approach to ensure the effective and efficient operation of the realization and support processes and the associated process network?		
Question 18: Processes related to interested parties (7.2)		
a) How has management defined customer-related processes to ensure consideration of customers' needs?		
b) How has management defined other interested-party-related processes to ensure consideration of interested parties' needs and expectations?		
Question 19: Design and development (7.3)		
a) How has top management defined design and development processes to ensure they respond to the needs and expectations of the organization's customers and other interested parties?		
b) How are design and development processes managed in practice, including the definition of design and development requirements and the achievement of planned outputs?		
c) How are activities such as design review, verification, validation and configuration management considered in the design and development processes?		

Question 20: Purchasing (7.4)		
a) How has top management defined purchasing processes that ensure purchased products satisfy the organization's needs?		
b) How are purchasing processes managed?		
c) How does the organization ensure conformity of purchased products from specification through to acceptance?		
Question 21: Production and service operations (7.5)		
a) How does top management ensure that the input to the realization processes takes account of customers' and other interested parties' needs?		
b) How are realization processes managed from inputs to outputs?		
c) How are activities such as verification and validation considered in realization processes?		
Question 22: Control of measuring and monitoring devices (7.6)		
a) How does management control the measuring and monitoring devices to ensure that correct data are being obtained and used?		
Question 23: Measurement, analysis and improvement — General guidance (8.1)		
a) How does management promote the importance of measurement, analysis and improvement activities to ensure that the organization's performance results in satisfaction of interested parties?		
Question 24: Measurement and monitoring (8.2)		
a) How does management ensure collection of customer-related data for analysis, in order to obtain information for improvements?		
b) How does management ensure the collection of data from other interested parties for analyses and possible improvements?		
c) How does the organization use self-assessment of the quality management system for improving the overall effectiveness and efficiency of the organization?		

Question 25: Control of nonconformity (8.3)		
a) How does the organization control process and product nonconformity?		
b) How does the organization analyse nonconformity for lessons learned and process and product improvement?		
Question 26: Analysis of data (8.4)		
a) How does the organization analyse data to assess its performance and identify areas for improvement?		
Question 27: Improvement (8.5)		
a) How does management use corrective action for evaluating and eliminating recorded problems affecting its performance?		
b) How does management use preventive action for loss prevention?		
c) How does the management ensure the use of systematic improvement methods and tools to improve the organization's performance?		

APPENDIX 2

Interviewer: Craig Clark

Interviewee: Name (Title, Top management as defined by ISO 9000)

(Name Management Rep.)

1. Equipment required

- Laptop computer and
- Interview schedule, (Questionnaire)

Explain reason for interview and what is required from interviewee.

2. Questions

2.1 Why ISO 9001:2000?

- Other management systems
- Excellence models

2.2 Who enforced/requested ISO certification?

- Was it externally driven or internally driven?
    i. Customer pressure
    ii. Top management

3. What benefits did you plan on achieving?

- Customer satisfaction (External)
    i. Time,
    ii. Cost
    iii. Quality

- Improving internal processes (Internal)
    i. Rework
    ii. Standardisation
    iii. TQM

4. What benefits did you achieve?

- Customer satisfaction (External)
    i. Time,
    ii. Cost
    iii. Quality
- Improving internal processes (Internal)
    i. Rework
    ii. Standardisation
    iii. TQM

5. Who was the management representative?

- Who did the appointment?
- Was it in writing?
- Did they have top management support?
    i. Cross functional borders
    ii. Single process
    iii. Conflict
    iv. Preferences

6. Did you make use of a consultant?

- Strategically
- Tactically.

7. What process/approach did you follow with the implementation?

- Books, Literature
- Case studies.

8. Who was the registrar and why?

- Who
    i. SABS, BSI
    ii. Did you ask for an interview?
- Why
    i. Based on what
    ii. Who made the choice?

9. How long did the process take?

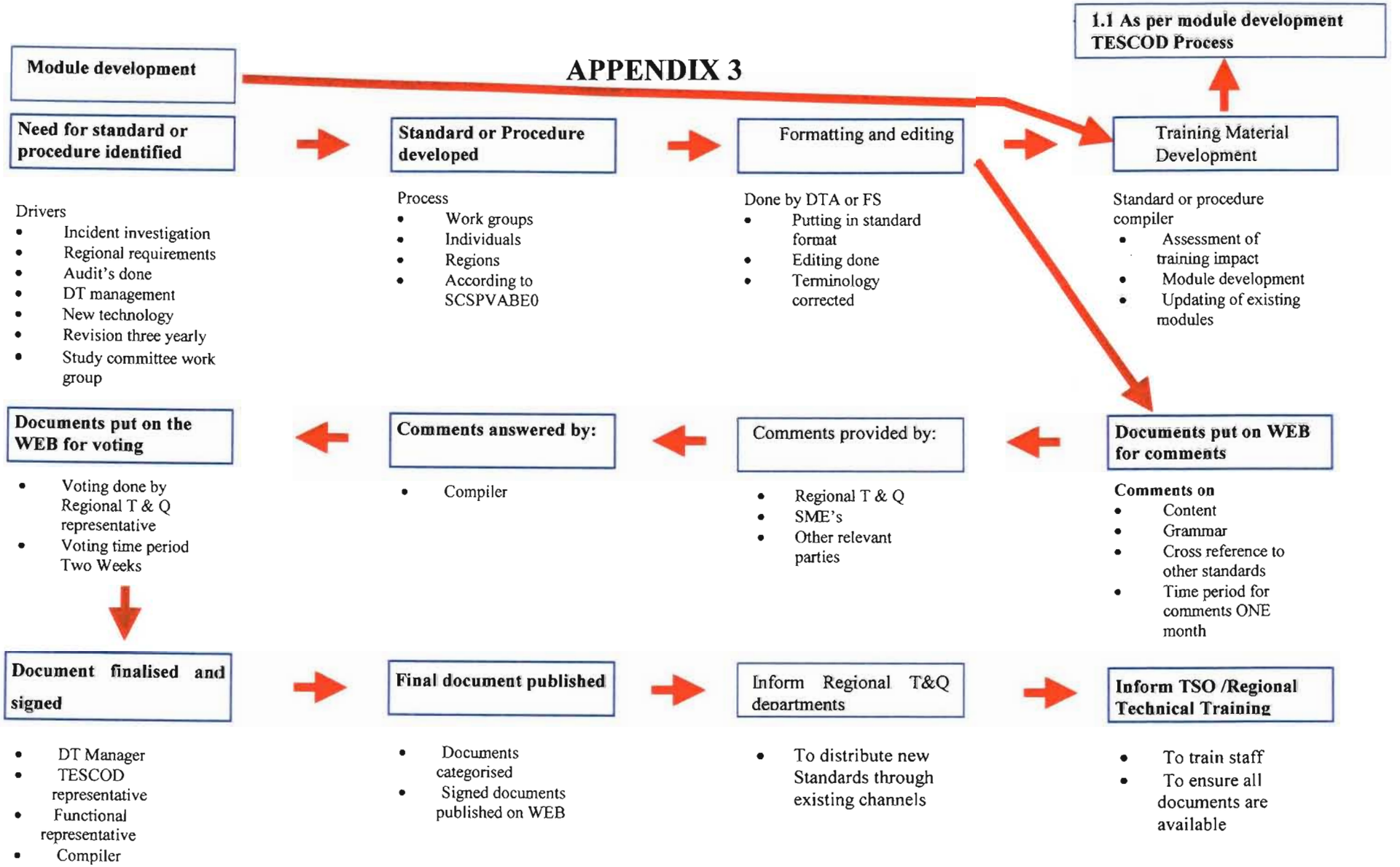
- Years
- Months

10. Did you have a L.S.I.?

- Training
- Staff buy in

11. Would you implement ISO now in hindsight ?

APPENDIX 3


Module development
Need for standard or procedure identified
Drivers
• Incident investigation
• Regional requirements
• Audit's done
• DT management
• New technology
• Revision three yearly
• Study committee work group
Standard or Procedure developed
Process
• Work groups
• Individuals
• Regions
• According to SCSPVABE0
Formatting and editing
Done by DTA or FS
• Putting in standard format
• Editing done
• Terminology corrected
Training Material Development
Standard or procedure compiler
• Assessment of training impact
• Module development
• Updating of existing modules
1.1 As per module development TESCOD Process
Documents put on WEB for comments
Comments on
• Content
• Grammar
• Cross reference to other standards
• Time period for comments ONE month
Comments provided by:
• Regional T & Q
• SME's
• Other relevant parties
Comments answered by:
• Compiler
Documents put on the WEB for voting
• Voting done by Regional T & Q representative
• Voting time period Two Weeks
Document finalised and signed
• DT Manager
• TESCOD representative
• Functional representative
• Compiler
Final document published
• Documents categorised
• Signed documents published on WEB
Inform Regional T&Q departments
• To distribute new Standards through existing channels
Inform TSO /Regional Technical Training
• To train staff
• To ensure all documents are available