

**THE ROLE OF INVENTORY CONTROL IN SERVICE
QUALITY IN A SOUTH AFRICAN ACADEMIC LIBRARY**

by

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DECLARATION

I declare that

THE ROLE OF INVENTORY CONTROL IN SERVICE QUALITY IN A SOUTH AFRICAN ACADEMIC LIBRARY

is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

.....
E RETIEF

June 2005

DEDICATION

I dedicate this dissertation to:

The dedicated

**LIBRARY MANAGEMENT RESEARCH
SECTION STAFF**

who are responsible for

INVENTORY CONTROL

**in the library of the
University of South Africa.**

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SUMMARY

Service quality has always been a tacit assumption within the delivery of academic library services, but since the 1990s demands for accountability from different stakeholders, including the clients, made service quality a highly debated and researched focus in academic libraries all over the world.

The scope of the study covers a wide-ranging analysis of discourses underpinning service quality and its accompanying performance indicators in academic libraries.

Using the academic library of the University of South Africa as an illustrative case study, this study examines the possible impact of inventory control on the service quality of the academic library in three areas, namely access to information resources, retrieval of information resources and positive implications for sound financial management. The study's findings all point to a positive enhancement of service quality in regard to the three areas mentioned.

KEY TERMS

Academic library

Assurance quality

Availability study

Complaining behaviour

Inventory control

Library catalogue

Performance measurement

Performance indicator

Quality management

Service quality

Shelf reading

Stock verification

Stocktaking

University of South Africa

ACRONYMS

ACFE	Association of Certified Fraud Examiners
ACRL	Association of College and Research Libraries
AENOR	Asociación Española de Normalización
AFNOR	Association française de normalisation
ANC	African National Congress
ANSI	American National Standards Institute
ARL	Association of Research Libraries
BPR	Business process reengineering
BS	British Standard
BSI	British Standards Institute
CAMILE	Concerted Action on Management Information for Libraries in Europe
CEN	European Committee for Standardization/Comité Européen de Normalisation
CENELEC	European Committee for Electrotechnical Standardisation
CERLIM	Centre for Research in Library and Information Management
CB	Complaining behaviour
CCTV	Closed-circuit television
CHE	Council on Higher Education
CUP	Committee of University Principals
DDCS	Dewey Decimal Classification System

DFG	German Research Council/Deutschen Forschungsgemeinschaft
DIN	German Institute for Standards/Deutsches Institut für Normung
EC	European Commission
EN	European Standards/Europäische Norme/Norme Européenne
EFQM	European Foundation for Quality Management
GALIC	Gauteng and Environs Library and Information Consortium
HEQC	Higher Education Quality Committee
IFLA	International Federation of Library Associations and Institutes
IIP	Investors in People
INQAAHE	International Network for Quality Assurance Agencies in Higher Education
ISO	International Organisation for Standardisation
JIS	Japanese National Standards
LISIM	Library and Information Sector Improvement Model
LMC	Library Management Committee, Unisa Library
LP	Lean production
MIS	Management Information Systems
NISO	National International Standards Organisation
NQF	National Qualifications Framework
OASIS	The Unisa Library Online Catalogue
OC	Organisational culture
QC	Quality circle

RADAR	Results, approach, deployment, assessment and review
RFID	Radio frequency identification
SABS	South African Bureau of Standards
SAQA	South African Qualifications Authority
SASCO	South African Students' Congress
SAUVCA	South African Universities' Vice-Chancellors' Association
SBL	Graduate School of Business Leadership, University of South Africa
SIS	Systems Intervention Strategy
SLA	Service Level Agreements
TQM	Total Quality Management
ULAMIS	University Library Abridged Management Information System
UNISA	University of South Africa

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF THE STUDY AND KEY CONCEPTS

The success of any organisation depends on its ability to provide and maintain satisfactory products (tangible commodities) and/or services (actions or transactions) that answer the needs of clients, and yet remain financially viable. Moreover, a reputation for high quality products and services is why certain organisations are considered industry leaders.

Quality, which is synonymous with excellence or effectiveness, is a relative concept that depends significantly on client satisfaction with an organisation's products or services. The quality of products and services is therefore of paramount importance to draw and retain clientele. However, there is disagreement about the exact nature of quality because it depends on circumstances.

Quality is measurable as:

- the excellence of a product or service,
- client satisfaction with a product or service, and
- conformity of a product or service with a given requirement (Glossary of highway quality terms 1996:14).

Williams (1994:23) states that quality is driven by, and therefore a product of an organisation's culture, a multidimensional concept based on inherent values, beliefs and assumptions shared by the organisation's employees (*Management principles* 1992:283; Martins 2003:8). According to Williams (1994:23), values as "matters or issues that an individual or organization regards as important" drive behaviour, and behaviour drives quality. Quality, therefore, can be identified as a value of an organisation.

Universities, as higher-education institutions, are actively engaged in a global striving towards excellence. A new culture of measurement and assessment of services is a response to the increasing competition facing higher-education institutions in a swiftly changing, information-flooded context. Harman (1998:346), an Australian educationist,

describes this trend as follows:

“Wherever you go, managers of higher-education systems and institutions today are concerned about quality and how to put in place appropriate quality-assurance mechanisms, while ministers, bureaucrats, employees and business interests are all increasingly concerned about the outputs of higher education institutions and the suitability of graduates to meet workplace needs.”

Quality in a higher-education context is as difficult to quantify as in any other, but the following description is typical:

“Quality is... judged in terms of the extent to which the product or service fits its purpose. This notion is quite remote from the idea of quality as something special, distinctive, elitist, conferring status or difficult to attain. It is a functional definition of quality rather than an exceptional one. If something does the job it is designed for, then it is a quality product or service” (Harvey & Green 1993:16-17).

An **academic library** is part of a particular academic institution (eg. college, university or other post-secondary educational institution) and it supports the research needs of its students, as well as the teaching and research needs of its faculty and staff (Harrod's librarians' glossary 1995:663).

Like institutions of higher education, academic libraries are under increasing pressure to conform to global standards of excellence. Chase (as cited by Mistry & Usherwood 1996:1) declares in regard to academic libraries that quality is not an option any more, but a positive requirement. Abbott (as cited by Webb 1994:2) writes that clients are becoming increasingly discerning and critical and expect the same high quality and efficiency as they do from commercial enterprises, with the result that in the 1990s accountability to clients and governments that provide funding increased sharply.

Since academic libraries are directly involved with the client and his or her specific need(s) it follows that the quality of their service is defined by what the client wants, and by when

and how the client prefers delivery of the service (HERNON as cited in Vergueiro & De Carvalho 2000:2). Poll and Te Boekhorst (1996:12) regards needs also as “implied needs” that reflect on possible future client requirements.

Clients of all academic libraries from residential as well as distance education institutions¹ include internal clients (staff) and external clients (learners). According to Begum (2003:23) an academic library has only two types of clients, namely: “those who are in a hurry and those who want to kill time”, but haste tends to override because of the urgencies of study and research. It can be taken as a rule that the academic library client is satisfied if, in his or her opinion,

- access is appropriate and available information is up to date and sufficient, and
- specific information can be retrieved immediately on demand.

Brindley (1992:31) describes quality in an academic library and information service as: “quality = performance - expectation”.

Performance refers to a library’s ability to fulfill the academic library’s mission in an effective and efficient manner, while **expectation** reflects a client’s anticipation in regard to the probable output of a service (Dalton 1991:9).

The belief exists that academic library functions and processes should be designed with a view to optimise service delivery and client satisfaction. Nitecki (1997:2) argues that “service quality contributes to value experienced” by clients, and that “value becomes an outcome of excellent service.”

1

“Distance education is planned learning that normally occurs in a different place from teaching and as a result requires special techniques of course design, special instructional techniques, special methods of communication by electronic and other technology, as well as special organizational and administrative arrangements” (Moore & Kearsley 1996:2).

Service quality in an academic library is defined by clients' expectations, and also by their perceptions of the actual service they receive. In other words, it refers to the client's judgement about "value for money" received from the academic library. In some cases there is a perceived congruence between what clients expect and what they encounter (Edwards & Browne 1995:163).

A study conducted by Banwet and Datta (2002:545) also found that "an enhancement in the quality of service led to the users' satisfaction, which in turn led to positive post-visit intentions."

Service quality in an academic library includes the following:

- the availability of qualified and experienced library staff that can identify appropriate and sufficient information resources on a given subject when needed,
- relevant collections (including online services), reflected in an up-to-date online catalogue,
- the easy retrieval of the needed information,
- an appropriate and/or client-preferred manner in which information can be delivered, for example by e-mail,
- the timeliness of a service in the sense of delivery when promised, and
- excellence of electronic service (eg. quick and easy access, client-friendly website, customisation, security/privacy, site aesthetics, reliability and responsiveness) (Kyrillidou & Hipps 2001:4).

Quality based on commercial considerations and the development of appropriate quality-assurance tools became the subject of major research efforts in the academic library and information service sector during the 1990s.

The application of a system's viewpoint gives a clearer understanding of service quality and

inventory control in the academic library as a highly complex and multifaceted system. A system's perspective, described in chapter 2, is a holistic approach to the academic library as a whole, referring to the interrelatedness of all functions in the academic library. These functions may behave relatively independently with their own purpose, but they retain the common mission and goals of the academic library.

1.2 PROBLEM STATEMENT

Like all other functions and activities in an academic library, inventory control of information resources has to contribute to the welfare and success of the whole organisation, which means the focus is on quality services to clients and a sound financial position.

Inventory control of information resources refers to the verification of the total library information resources stock held by a specific academic library.

Numerous and extensive inventory-control studies in regard to academic libraries have been published internationally over time to describe some or all of the following:

- inventory-control methods,
- inventory-control processes,
- problems relating to inventory control,
- the statistical results of inventory control (eg. the number of information resources not found),
- the cost of inventory control,
- the human resources capacity required to implement inventory control, and
- conclusions in regard to the advantages and disadvantages of inventory control.

No study in South Africa has ever been done to determine the degree of positive influence

of inventory control, as a support function, on the service quality of an academic library (Nexus Database 2005). One of the following two quantifiable possibilities will result from such a study:

- There is a significant degree of positive influence.
- The degree of positive influence on the service quality of an academic library is not significant.

A negative outcome is either a direct indication of the futility of inventory control in regard to service-quality enhancement in an academic library, or it is an indication that the academic library's core business of providing access to and retrieval of information resources does not require improvement.

Nevertheless a positive outcome needs to be correlated with the inventory-control cost incurred to be able to make meaningful recommendations for future inventory-control initiatives.

Against this background the core problem of this study can be stated as follows:
to investigate the role of an inventory-control project in service quality in an academic library.

The relevant subproblems can be defined as the following tasks:

- Provide an overview of what constitutes service quality in academic libraries. This will be done by investigating methods of quality performance measurements developed for academic libraries.
- Define inventory control and present a historical background for this study.
- Describe a fully functional inventory-control function in a South African academic library as a case study.
- Gather quantifiable data from the inventory-control outcomes and from service-quality

performance measurement data that reveal the general quality of service of the academic library before and after inventory control.

- The quantifiable data will be used to test the degree of positive influence of inventory control on an academic library's two main service components, namely access to and easy retrieval of information resources.

1.3 RESEARCH METHOD

According to Babbie (2001:91) social research is mostly done to explore and describe a specific topic or subject area. The exploratory and descriptive research methods used in this study do not establish cause and effect relationships under experimental conditions.

The purpose of this study explore the main concepts of service quality and inventory control, as well as the possible relationship between them. As a preliminary step in the investigation, extensive literature studies of these two concepts are conducted. These literature studies provide historical and current information to help define the concepts and to understand the academic library milieu in which these concepts are applied.

As with any other library function, inventory control of information resources has a tried, tested and proven technical expertise which differentiates the practitioner of information resources inventory control from the other library professionals. Although different ways of determining information resource loss have been tried through the years, all these methods and techniques had the same basic objectives, namely to:

- determine the actual number of items not found through mis-shelving,
- pinpoint the exact number of missing, mutilated and stolen items, and
- predict vulnerable information resources.

Concerning the empirical study, a specific academic library with at least a five-year proven inventory-control experience and above-mentioned inventory-control objectives has been chosen as a case study. Two main library service goals were chosen, namely access to and retrieval of information resources, as well as financial implications of inventory control on the academic library. Specific service-quality components with a close relation to

inventory control were identified under each of the three aspects chosen. Existing service-quality performance measures applied by the chosen academic library were then selected for investigation (see table 1.1).

TABLE 1.1
RESEARCH METHOD

Service-quality goal	Service-quality component	Performance measure
Access to information resources	Library catalogue	<ul style="list-style-type: none"> • Client complaining behaviour in regard to the perceived state of the library catalogue before and after inventory control. • Number of changes to the library catalogue after inventory control.
Retrieval of information resources	Availability of information resources	<ul style="list-style-type: none"> • Quarterly availability study outcomes (number of information resources that are immediately obtainable) before and after inventory control.
	Shelf order	<ul style="list-style-type: none"> • The number of misplaced information resources corrected during the inventory-control project of March 2003 to February 2004. • Client complaining behaviour concerning the order of information resources on the shelves before and after inventory control.
Sound financial management	Inventory control	<ul style="list-style-type: none"> • Total cost incurred. • Cost per missing information resource found.
	Shelf reading as prerequisite step for inventory control	<ul style="list-style-type: none"> • Total cost incurred. • Cost per information resource checked on the shelf and corrected if needed. • Benefits from inventory control.

The individual performance measures used in this study will be discussed in chapter 5.

1.4 CHAPTER DIVISION

In this study the chapters are presented as follows:

Chapter 1:	Introduction
Chapter 2:	Service quality in academic libraries
Chapter 3:	Inventory control of information resources
Chapter 4:	A case study: the library of the University of South Africa
Chapter 5:	Analysis of an inventory-control project in the Unisa Library
Chapter 6:	Summary, findings and recommendations

1.5 SUMMARY

Focussing on an inventory-control project in a specific academic library, the study endeavours to investigate the results of such a project in regard to service quality. In terms of theoretical approaches and methodology this study is exploratory and descriptive in orientation and different research instruments are used to collect data.

The study was conceived as a means of increasing the available knowledge of practitioners of information resource inventory control and to make a contribution to international debates about inventory control in academic libraries.

To understand the term “service quality” and its development in academic libraries, the next chapter offers an historical overview of the development of service quality in general and specifically in academic libraries.

CHAPTER 2

SERVICE QUALITY IN ACADEMIC LIBRARIES

2.1 INTRODUCTION

The investigation into the impact of information resources inventory control on the service quality of an academic library is founded upon theoretical and empirical research into:

- the concept of service quality in various fields and disciplines,
- service quality in academic libraries, and
- information resources inventory-control practices in academic libraries.

Service-quality theories, their roots, and current standards and certification practices, are presented in the first part of this chapter. Many of these theories are based on a systems approach. The concept of a system and its five components, namely inputs, process, outputs, feedback and environment, are described for background purposes.

The historical overview presented in this study provides a framework for the study of service quality in academic libraries as discussed in the latter part of this chapter.

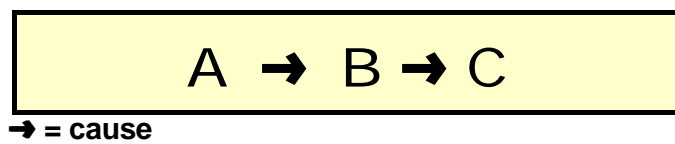
2.2 THE ORGANISATION AS A SYSTEM

The structure through which people may exchange goods or services can be called by a variety of names (eg. company, enterprise, firm, institution, authority, corporation or organisation).

The term “**organisation**” in this study refers broadly to a public or private human structure that has a specific mission and goals and exchanges goods or services. As a service entity, an academic library can also be defined as an organisation.

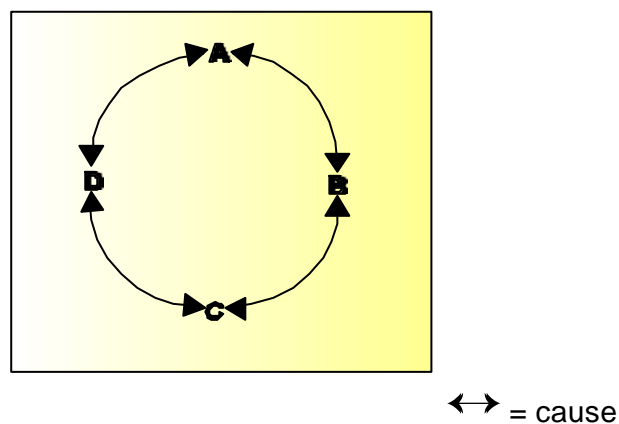
The concept of a system dates back about 200 years and was borrowed from engineering. For example, the James Watson's steam governor selected the engine combustion speed through the amount of oxygen supplied. In other words, there was a linear causality, namely B (the engine combustion speed) was caused by A (the amount of oxygen) (see figure 2.1):

FIGURE 2.1
LINEAR CAUSALITY



The systems approach became popular during World War II when interdisciplinary teams of scientists were brought together to find solutions to military challenges and applications (Optner 1965:4). Leonard and Beer (1994:2) confirm this and add that “chains of circular causality (e.g., A causes B causes C causes D causes A causes B...), appeared again and again in the basic processes they described. After the war, many of these researchers began to communicate with colleagues following parallel tracks in biology and psychology.” Circular causality is illustrated in figure 2.2.

FIGURE 2.2
CIRCULAR CAUSALITY

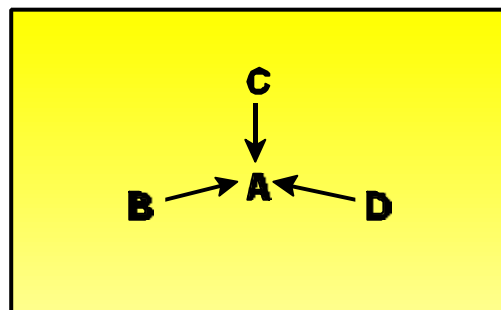


For this study a **system** can be defined as a group of independent but interrelated components, also called subsystems or elements, connected together in an organised manner to form an unified whole with a specific mission and goals.

A system has a limited range of products and/or services that are defined by its mission and goals. The limits of the range are called boundaries. Every component in the system also has a restricted area of operation with unique key performance areas.

In accordance with this perspective, it means that changes to one component of the organisation must affect other components, with the result that rather than a single cause, an operational problem in an organisation usually have multiple causes (eg. A can be caused by B, C and D [see figure 2.3]) (Schorbek, Kefalas and Schorbek1975:30).

FIGURE 2.3
MULTIPLE CAUSALITY

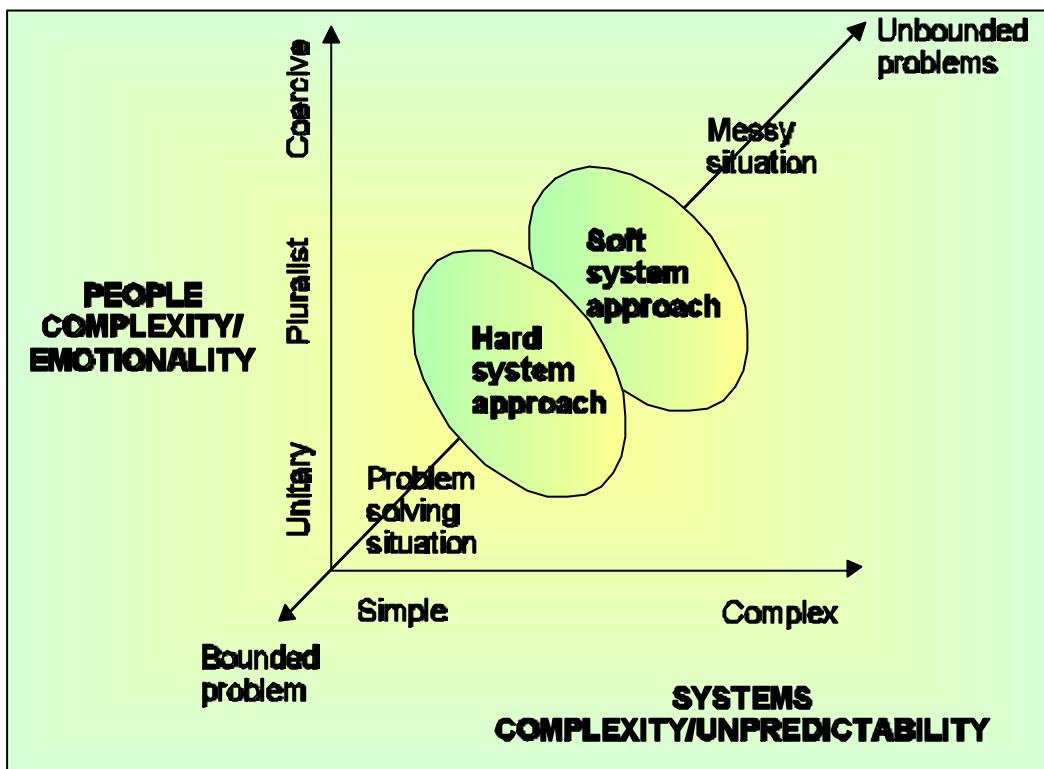


→ = cause

Numerous systems approaches were generated since the period around World War II, such as Operations Research (Churchman, Ackoff & Arnoff 1957), Cybernetics (Ashby 1956), Viable System Model (Beer 1959), Systems Dynamics (Forrester 1961), General Systems Theory (Von Bertalanffy 1968), Social Systems Design (Churchman 1971), Systems Analysis (Atthill 1975), Soft System Methodology (Checkland 1981), Strategic Assumptions Surfacing and Testing (Mason & Mitroff 1981), Multimodal Systems Thinking (De Raadt 1989), and Total Systems Intervention (Flood and Jackson 1991).

An “approach” refers to the theories, methods, techniques and tools a person or organisation applies to solve a problem. It follows that a systems approach implies some form of intervention. There are two main systems approaches, namely hard systems approaches and soft systems approaches. The differences between the two systems approaches are illustrated in figure 2.4 and explained in table 2.1.

FIGURE 2.4
HARD AND SOFT SYSTEMS APPROACHES



Source: Based on Senior (2002:14), and an article by Jackson and Keys (1984:473-486).

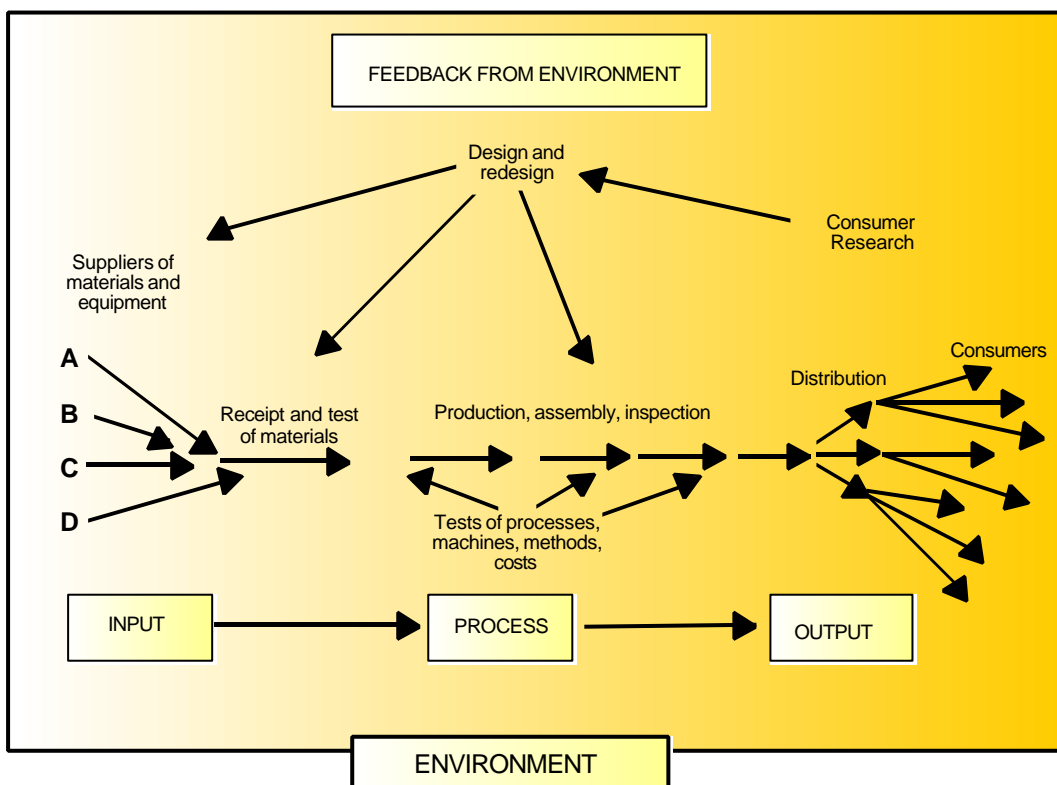
TABLE 2.1
THE DIFFERENCES BETWEEN HARD AND SOFT SYSTEMS APPROACHES

	Hard systems approach	Soft systems approach
Origin	Before and just after World War II	During 1960's and 1970's
View of problem	Bounded problems that are clearly described, predictable and low in emotionality.	Unbounded problems that are not easy to identify and describe, rather unpredictable and high in emotionality.
Examples	Operations Research, Systems Analysis, Systems Intervention Strategy (discussed in chapter 3) .	Soft Systems Thinking, Interactive Planning, and Social Systems Design.
Type of system	Simple - "...characterised by having a small number of elements with few, or at least regular, interactions between them. Such systems are likely to be governed by well-defined laws of behaviour, to be largely closed to the environment, to be static overtime, to be unaffected by behavioural influences, and to have subsystems that are passive and do not pursue their own goals" (Jackson 1991:28).	Complex - "...characterised by having a large number of elements that are highly interrelated. Such systems are probabilistic, open to the environment, evolve over time, are subject to behavioural influences, and have purposeful parts" (Jackson 1991:28).

<p>Relationship between participants</p>	<p>Unitary - “ ...the participants associated with a particular problem context are in genuine agreement on objectives, share common interests, have compatible values and beliefs, and all participate in decision making” (Jackson 1991:28).</p> <p>Pluralist - “ ...the participants have divergent values and beliefs and, to some extent, differing interests and objectives, but a genuine accommodation or compromise can be reached upon which all agree” (Jackson 1991:28).</p>	<p>Pluralist - “ ...the participants have divergent values and beliefs and, to some extent, differing interests and objectives, but a genuine accommodation or compromise can be reached upon which all agree” (Jackson 1991:28).</p> <p>Coercive - “ ...there is little common interest between the participants, there is a fundamental conflict, and the only consensus that can be achieved is through the exercise of power and through domination” (Jackson 1991:28).</p>
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Originally the systems concept was confined to the manufacturing sector where it was divided into three phases, namely input, process and output, to which feedback and environment were later added (see figure 2.5). Linear, circular and multiple causality are found in systems. The concept of systems as viewed by Deming (1900 - 1993), an American statistician and management theorist, includes the service sector.

FIGURE 2.5
AN ORGANISATION AS A SYSTEM



Source: Based on Deming (1982:4).

The five phases of a system, namely input, process, output, feedback and the environment, are described in table 2.2.

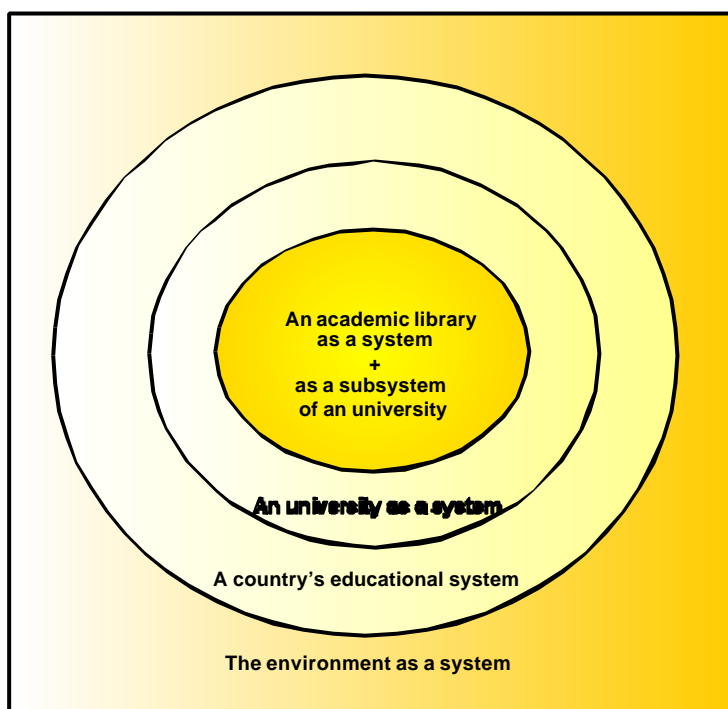
TABLE 2.2
PHASES OF A SYSTEM

Phase	Description
Input	<p>An input comprises the ingredient(s) from the environment “whose functional relationships can be arranged to produce the required end-product” (Optner 1965:93).</p> <p>An organisation’s inputs received from the environment are among others:</p> <ul style="list-style-type: none"> • human resources needed to operate the organisation • capital to run the organisation • physical support (eg. material and equipment needed to function effectively, such as the latest information technology).
Process	<p>A process is the transformation or processing of the inputs into the organisation’s products.</p> <p>Processes include the manufacturing system, the operational system and the management system related to the processes. Examples of processes in an academic library are the purchasing function, the retrieval function and the inventory-control function.</p>
Output	<p>An output is the end result of the process. It also identifies the purpose for which the organisation exists. In the case of an academic library it is the access to information resources through the information service and library computer catalogue.</p>
Feedback	<p>Feedback refers to the information received from:</p> <ul style="list-style-type: none"> • the client/user satisfaction • control mechanisms to maintain reliability and accuracy of the end product (outputs).
Environment	<p>The environment is the widest possible area around a system that can directly or indirectly influence or disturb the system or a component of it.</p>

An academic library is a system in its own right, as well as a subsystem of greater systems (eg. the university as the parent organisation - see figure 2.6). The academic library can be influenced by decisions taken at university management level (eg. budget cuts), and by the environment (eg. the population growth and the increased demand for higher education, rivalry of other universities and academic libraries, global spread of information on a global basis, and new developments in information technology).

FIGURE 2.6

**THE
LIBRARY AS
AND A
M**



**ACADEMIC
A SYSTEM
SUBSYSTE**

The concept of stakeholders is an operational term for the totality of the environment (Kefalas 2001:94), and a part of the environment can become a stakeholder of an organisation "as long as it stands to gain or lose something as a result of the functioning of the organisation." A stakeholder can be any of the following: employees, clients, shareholders, government, suppliers, debtors, media, financial institutions, ecology and general community.

Drucker (1994:53) describes the depth and complexity of the influences an organisation

is confronted with. He notes that organisations today are in the midst of the most extreme environmental changes in recorded history. To be successful in this rapidly changing environment, an organisation needs to respond appropriately to the stimuli presented. This response, also called system's behaviour, will vary according to the contents and the structure of the system. For example:

- Homeostatic - the system maintains its internal operating characteristics regardless of the number of stimuli it is confronted with.
- Adaptive - the system accommodates the different stimuli and replies with responses that clients find valuable.
- Goal-seeking - the system can respond effectively and creatively to multiple stimuli through its dual ability to adapt and adopt stimuli by changing its responses, own content and/or structure (Ring 1999:2).

Garcia (2004:2) argues that radical changes in the environment can impact an organisation “to the point of massive disruption that can lead to transformation at a system-wide level.” He views transformation as a necessary process that all organisations will have to deal with at some point in their life cycle (Garcia 2004:6).

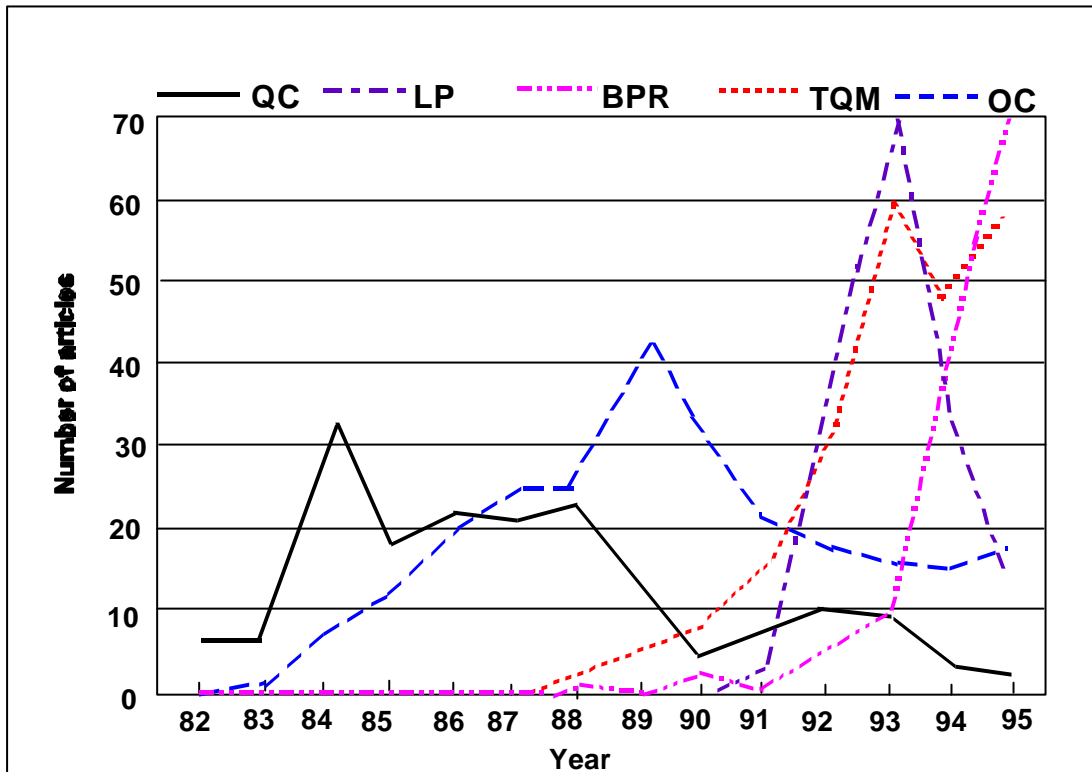
2.3 HISTORICAL PERSPECTIVE OF QUALITY

There was a radical shift in the public sector’s management practices in recent decades. Emphasis was placed on efficiency and effectiveness in the delivery of a high-quality service to the end-user. This resulted in the development of management systems that displayed different quality levels.

Some commentators characterise the new management approaches as “fads” followed by fashion-conscious managers who wish their organisations to be seen as pioneers of management theory. An example of an author presenting this view is Shapiro (1995) in his book titled *Fad surfing in the boardroom: reclaiming the courage to manage in the age of instant answers*.

According to Kieser (1997:51) these trends can be shown empirically by calculating over time the number of publications (all types of information resources) which appear on a specific management approach (eg. Total Quality Management - see figure 2.7).

FIGURE 2.7
WAVES OF MANAGEMENT FASHIONS AS MEASURED
BY NUMBERS OF PUBLICATIONS



QC = Quality Circles

TQM = Total Quality Management

LP = Lean Production

OC = Organisational Culture

BPR = Business Process Reengineering

Source: Kieser (1997:51).

Gill and Whittle (1993:282) identify five stages in the progress of a management style, namely:

- creation of the management approach,
- dissemination when the idea is presented to the intended market,
- acceptance when the idea is implemented by organisations,

- disenchantment when the management idea is criticised, and
- decline or abandonment of the management style.

2.3.1 Quality circles (QCs) and Total Quality Management (TQM)

All the concepts, theories and models developed over the past 30 years were ultimately grounded in Quality circles (QCs) and Total Quality Management (TQM).

During the late 1970s to mid-1980s American businesses were looking for ways to survive in a hostile environment of recession, low productivity, downsizing, deregulation, and an increasing trade deficit. At the same time, clients started to expect more from companies and their products and **services**. The steps taken by these companies to rectify the situation proceeded from the same principles that were driving **quality** in the global business world since the early 1980s. These principles developed from the quality improvement movement and can be traced back to a Japanese invention, called QCs, developed by Deming in the 1950s. Williams (1994:6) writes that QCs involved employees directly in weekly meetings to discuss work quality and possible workplace improvements. In other words, it encouraged staff participation in the underlying principle of continuous self-appraisal. Traditionally quality was only linked to the end product. If the product did not pass inspection it meant the cost of producing the product was wasted. The result of QCs was an improvement in quality at less cost.

Deming later focused more on a management philosophy and developed the fourteen principles of TQM, which resulted in a dramatic economic growth for Japan (Masters 1996:1). Juran was a contemporary of Deming and his contribution to the quality-improvement movement was his insistence that organisations had to be client orientated (Williams 1994:12).

Some researchers stress the fact that **Total Quality Management (TQM)** is an all inclusive term for an organisation's quality programmes, whilst Urs and Dominic (1999:2) postulate that TQM is a two-pillar concept, namely a management philosophy and a practical guideline to implement this philosophy. Jayamalini (1999:1) agrees with this belief when he declares that TQM "provides the tools and the direction to improve quality" in libraries.

Today TQM is seen as a new perception of organisational management, needing a different kind of thinking pattern, which results in a new organisational culture.

Melnyk and Denzler (1996:295) and Reynolds (1994:84) confirm that TQM is the culture of an organisation, but add that attitude and the organisation of an institution must also be included. This culture embraces a total commitment to the provision of products and services that satisfy client needs. It demands quality in all aspects of an organisation's activities and every employee should participate wholeheartedly in this commitment.

According to Pearce & Robinson (2003:328-330) the following ten principles ensure TQM in an organisation:

- define the term quality and client value,
- be client orientated,
- reevaluate the organisation's processes,
- network and develop sound relationships with clients and suppliers,
- be proactive,
- promote accuracy,
- be fact orientated,
- involve every staff member,

- create an atmosphere that encourages participation, and
- improve continuously.

Although TQM became steadily more popular in the West since the early 1980s, these principles were only adopted in the library and information services environment in the 1990s. Jurow and Barnard (1993:2) describe TQM in an academic library and information services sector as a management system based on continuous improvement of services, participation of all staff members and knowledge of the library's client needs and requirements.

Masters (1996:5) states that many libraries adopted TQM with great success. An academic library gains the following from implementing TQM principles:

- removal of barriers between departments or divisions,
- establishment of internal and external target groups of library services, and
- constant improvement of services.

Sirkin (1993:71-83) identifies a number of ways in which the principles of TQM could be used in an academic library environment, for example the use of a client survey to determine the client satisfaction level for a specific library service, the improvement of signage in the library, and the follow-up of clients' complaints. He also warned that it is not possible to satisfy every client's needs. Although choices must be made regarding which needs to fulfill, there is no denying that TQM improves service quality and active employee involvement, resulting in enhanced staff morale, and therefore better client service.

2.3.2 Lean production (LP)

(Womack, Jones & Roos 1990:225) explain lean production (LP) as

“a superior way for humans to make things. It provides better products in wider variety at lower cost. Equally important, it provides more challenging and fulfilling work for employees at every level, from the factory to the headquarters. It follows that the whole world should adopt lean production, and as quickly as possible.”

Lean production (LP) contains all the attributes of TQM, such as client-focused organisations, value of the end product decided by the client, teamwork including QCs, and continuous improvement, but combines them into a working system that requires a minimum of resources. Smith, (et al) (2002:13) list the resources as follows:

- The organisation will run with a minimum of invention.
- Suppliers will deliver just-in-time.
- High-performance work teams are formed.
- TQM is used to eliminate production/service processes.

LP became popular in the late 1980s in car assembly plants worldwide. For example, the Toyota-General Motors joint venture in California in the United States demonstrated very high productivity levels when LP was implemented.

The effectiveness of LP became the subject of considerable debate when the impact of other factors, particularly human-centred approaches, on high productivity was pointed out by Volvo in Scandinavia (Berggren, Adler & Cole 1994:37-49).

Today LP has lost its popularity as a management style that never influenced academic libraries because they are service organisations.

2.3.3 Business process reengineering (BPR)

The work of Hammer and Champy (1993) introduced business process reengineering (BPR). They argue that few organisations consider the advantages of information technology and take steps to make their processes fully automated. Merely automating existing processes does not guarantee improved performance. Smith (et al) (2002:14) define BPR as a reviewing system that changes processes so that the resultant more efficient enterprise can survive in today's competitive business environment.

Business process reengineering (BPR) is also called business process redesign, defined by Davenport and Short (1990:11) as “the critical analysis and radical redesign of existing business processes to achieve breakthrough improvements in performance measures.”

TQM encourages attention to business processes, and TQM and BPR share a cross-functional perspective. According to Davenport (1993:11) TQM's emphasis is on incremental change and increasing process improvement, whilst BPR usually ends in radical change and drastic process improvement (see table 2.3).

TABLE 2.3
PROCESS IMPROVEMENT (TQM) VERSUS PROCESS INNOVATION (BPR)

	IMPROVEMENT	INNOVATION
Level of change	Incremental	Radical
Starting point	Existing process	Clean slate
Frequency of change	One-time/Continuous	One-time
Time required	Short	Long
Participation	Bottom-up	Top-down
Typical scope	Narrow, within functions	Broad, cross-functions
Risk	Moderate	High
Primary enabler	Statistical control	Information technology
Type of change	Cultural	Cultural/Structural

Source: Davenport (1993:11).

BPR has a tarnished history in practice, because organisations usually interpreted and implemented this system to suit their own internal purposes. The BPR process was often poorly planned and implemented, and many employees were left disillusioned. BPR became associated with quality, downsizing, a flatter structure, and the inevitable disappearance of middle management, with the result that employees have become very reluctant to participate in any BPR project.

It is still a popular management style and in full swing worldwide. Academic libraries were, and still are, influenced by this management style because of radical changes in the environment that require radical measures to ensure survival. Examples of BPR in academic libraries are described by Bjoernshauge (1999a; 1999b) and Raubenheimer (2004). In academic libraries BPR usually does not influence the inventory-control function, but it tends to introduce new technology and thereby streamline inventory-control processes.

2.3.4 Organisational culture (OC)

The term “culture” can be defined as:

“a pattern of basic assumptions - invented, discovered, or developed by a given group as it learns to cope with its problems of external adaptation and internal integration - that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems (Schein 1985:9).”

Organisational culture (OC) grew out of the human-relations perspectives of organisations in the 1940s. Later, interest in OC waned because it did not keep up with the more popular quantitative approaches emerging in the general organisational and social sciences. Organisational climate studies that were important during the 1960s and 1970s (Denison 1990:5) helped to revive interest in OC, which was popularised in the early 1980s.

Organisational culture (OC) is a multidimensional concept that encompasses the assumptions, norms, beliefs, behaviours and values (some even unstated) shared by the employees of an organisation (Pearce & Robinson 2003:298). Ehlers and Lazenby (2004:184) summarise it in the words “the way we do things around here.” Every organisation has its own unique culture.

Quantifiable accountability in regard to service outcomes, as well as rapid innovations in information technology are required in the environment of academic libraries to cope with changes in higher-education institutions, budgetary constraints, competition, and increasing diversity of employees and clients. These changes have, and are still impacting dramatically on the stability and status quo of academic libraries, with the result that new organisational models and cultures have emerged.

An example of OC research in academic libraries is the study of Martins (2003) regarding the influence of organisational culture on the creativity and innovation in an academic library.

2.4 STANDARDS

The term “standard” is sometimes used as a synonym for quality, eg. the standard of this service is high whereas the quality of that service is low” (Ashcroft 1995:25).

For this study a **standard** is seen as an aspect of quality. Standards are minimum criteria for products and services in a specified field agreed upon by consensus and approved by a recognised standards body. These standards are developed to safeguard the clients’ interest (Conti 1993:27). In some instances standards are also known as characteristics prescribed for products, rules or guidelines (eg. Guidelines for Distance Learning Library Services) (Association of College and Research Libraries 2004).

The era of international standards started in the late 1970s. The British Standard 5750 (BS 5750) is a body of written standards, developed in 1979 by the British Standards Institute (BSI), to ensure specific quality standards from suppliers. The BS 5750 was based on a military standard, namely the Defence Standards 0521, developed by the British Ministry of Defence during World War II (British Standards Institute 2005:2).

These standards were adopted in 1987 by the International Organisation for Standardisation (ISO) and resulted in a series of written international quality system standards. Today ISO standards include different kinds of business ventures, for example industries, software developers, and service institutions, such as academic libraries.

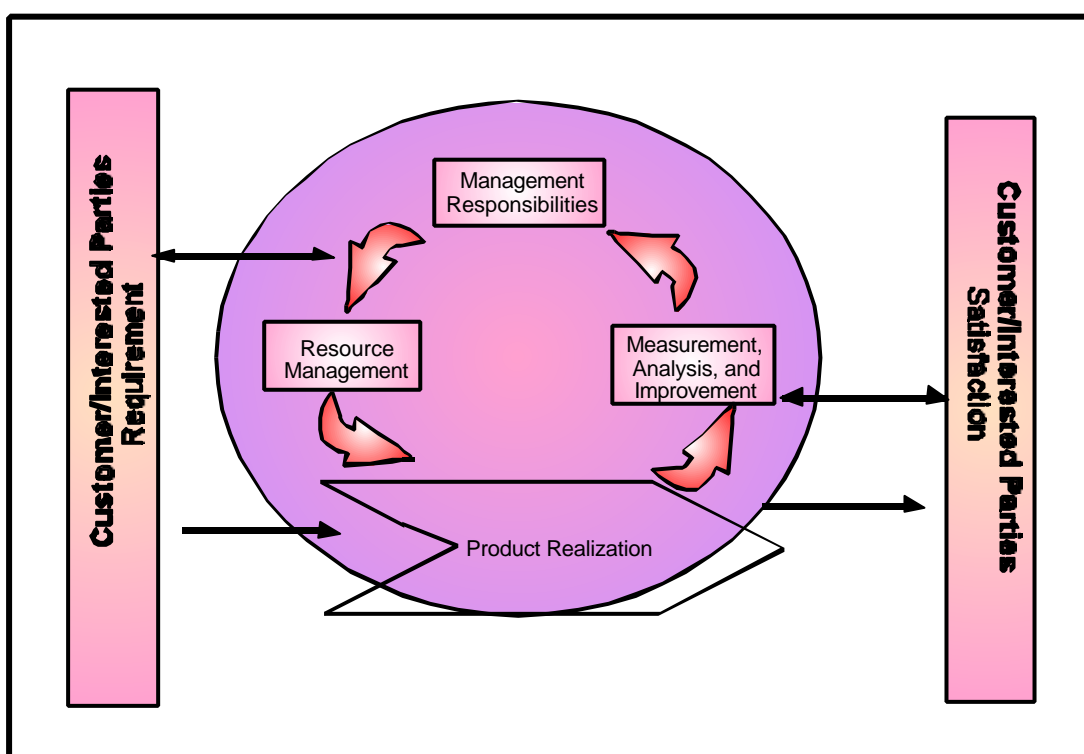
Examples of existing standard bodies based on ISO standards are:

- Asociación Española de Normalización (AENOR)
- Association française de normalisation (AFNOR)
- British Standards Institute (BSI)
- Deutsches Institut für Normung (DIN)

- European Committee for Standardisation/Comité Européen de Normalisation (CEN), with subcommittees (eg. European Committee for Electrotechnical Standardisation [CENELEC])
- Japanese National Standards (JIS)
- South African Bureau of Standards (SABS).

Pearce and Robinson (2003:334) explain the ISO 9001 process approach with its emphasis on stakeholder requirements and satisfaction in figure 2.8. This graphic presentation clearly shows that an organisation's activities begin and end with the stakeholders. In this regard the internal and external clients' requirements (needs and expectations) are paramount.

FIGURE 2.8
THE ISO 9001 PROCESS APPROACH



Source: Adapted from Pearce & Robinson (2003:334)

An example of standards for distance education libraries is the *Guidelines for distance learning library services* of the Association of College and Research Libraries (ACRL) (2004).

2.5 QUALITY CONTROL

Harvey and Green (1993:11-28) analysed the different definitions of quality in education and concluded that there are five distinct types of perspective on quality, namely quality expressed:

- in the excellence of a product or service,
- in consistent accuracy or perfection,
- in fulfilment of the institution's purpose,
- in the value a client gets for the money he or she paid, and
- in change resulting in transformation.

These perspectives or principles are closely related aspects of quality in that any one of them implies and affects the rest (Ngwenya 2003:4).

There is a growing conviction that the emphasis should be on creating rather than defining quality (Kinnell, Usherwood & Jones 1999:21), to which end the management team of the organisation needs to take three actions (Juran & Gryna 1993:3-9):

- quality planning (know what needs to be done according to minimum quality guidelines and standards),
- quality control (know what the situation is at a particular moment), and
- quality improvement (know what needs to be improved).

Although quality is crucial, it cannot be implemented without control. Unfortunately, many definitions of control have a flavour of reward or punishment (Ngwenya, 2003:31). For example Kloppenborg and Petrick (2002:75) take the view that “control is the activity of ensuring conformance to standards and taking corrective action when necessary to correct problems.”

Tannock's (1992:109) view of **quality control** as a continuously operational technique that ensures compliance with quality standards is definitive for this study.

2.6 QUALITY ASSURANCE

Quality assurance is a process directed towards achieving quality, and, as noted by Stebbing (1989:3), although it has been described in numerous publications, it remains a very misconstrued and misunderstood concept due, at least in part, to its unfortunate title which is at best misleading and at worst meaningless in the context of all its implications. Stebbing (1989:3) defends this perspective by blaming the absence of an internationally known and accepted definition of quality. He also maintains that the same situation prevails with respect to the concept of quality control. The concept of quality assurance can be refined to the following criteria:

- cost-effectiveness of a product or service,
- enhanced productivity and accuracy, and
- staff involvement.

Juran (1989:361) believes that quality assurance is an independent performance measurement. In *Quality assurance in open and distance learning* (1999:2-3) quality assurance is defined as measures taken by the institution to set particular standards in place and to keep to those standards for every product or service delivered. A TQM equation is identified in the same publication:

Quality control + quality assurance + continuous monitoring and evaluation = TQM.
According to this equation quality assurance is integral to TQM.

Quality assurance is a system of management procedures that are designed to ensure achievement of pre-specified requirements aimed at building key stakeholders' confidence in management's ability to produce quality products and services so that the organisation's envisaged outcomes can be realised.

Stepping (1989:2) warns that in today's management environment no management team can ignore or delegate quality assurance.

2.7 QUALITY BURNOUT

The management of service quality can lead to quality burnout if it is not handled correctly. This will lead to resistance to the pursuit of quality and a return to traditional work procedures which is a highly undesirable situation.

Barry (1994:2) gives the reasons for **quality burnout** as the result of an organisation's preoccupation with one after the other specific achievements that are programme orientated and not treated as integral to the organisation's culture and strategic focus.

Symptoms of quality burnout include:

- staff members' questioning the organisation's focus on quality,
- staff members' perception of this focus on quality as just another managerial technique,
- staff members' reversion back to traditional techniques,
- a shift away from quality as the top priority of the organisation, and
- delegation by top management of responsibility for quality coordination to lower levels of management (Barry 1994:2).

Quality burnout can be prevented by integrating quality into the strategic plan of the organisation as a process of continuous improvement.

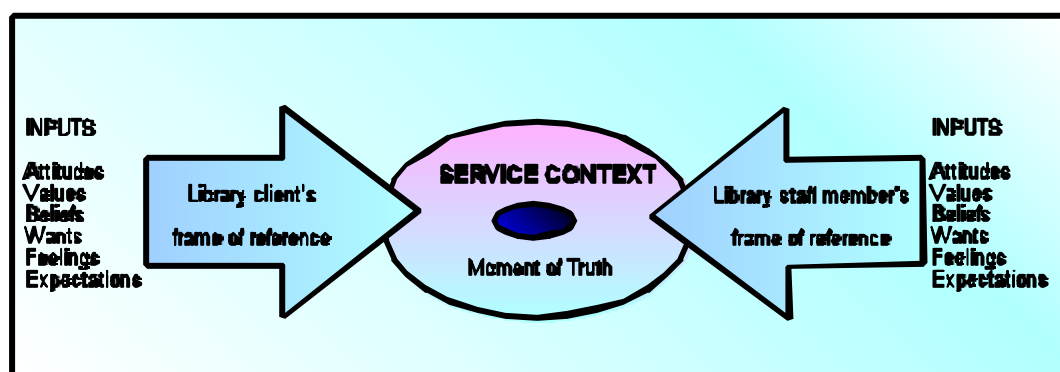
2.8 ACADEMIC LIBRARY SERVICE QUALITY

Zeithaml, Parasuraman and Berry (1990:16) name three features that distinguish service quality from quality in industry, namely:

- It is less easy for clients to evaluate service quality than product quality.
- The way service is delivered cannot be separated from the outcome of the service.
- Only customers judge quality.

Albrecht (1992:116) introduces the concept of “moments of truth”, which he defines as “any episode in which the customer comes into contact with the organization and gets an impression of its service.” In other words, perceptions about the service are formed in “moments of truth” that are based on personal observations and experiences. Albrecht and Bradford’s moment of truth model (as cited by Cram 2003:7) shows the diversity of factors influencing a service context (see figure 2.9).

FIGURE 2.9
MOMENT OF TRUTH MODEL



Source: Adapted from Cram (2003:7).

Albrecht (1992:54) is also adamant that quality must start with the client, “not with the tangible product sold or the work processes that create it. This is a profound change in focus, from activities to outcomes.”

Increased demands for accountability made the measurement of service quality essential for service organisations. A variety of methods developed over the years, depending on how organisations defined quality.

The focus of this section of the study is the growth and development approaches to service quality in academic libraries. The aim is not to analyse these approaches, but only to give an overview.

2.8.1 The nature of library service quality

Academic libraries faced major changes over the past decade, and one of these was client access, which was extended from specific visiting hours to an unbroken 24-hour service that never stops. An equally significant change is that client preferences are taken into account, although these clients might never see the inside of the specific academic library. These changes are attributable to the dramatic changes and developments in information technology.

Reid (2000:1) confirms this:

“The world wide web has revolutionised the availability and delivery of information as never before. As more and more information providers make their databases available over the web, no longer do individuals have to come to the information service to search for information.”

These phenomenal technological changes increased the need for academic libraries to become part of the global community and to be well-informed about the electronic possibilities of providing information service to its sophisticated clients. On the other hand information-literacy instruction also became an integral part of services rendered by the academic library to clients who are not yet competent in this regard.

Today library services are designed to meet the clients' needs and requirements, and clients are expecting, and even demanding, excellence from academic libraries. Measures used by British academic libraries to encourage service quality in their libraries, included the introduction of Service Level Agreements (SLAs), in which minimum criteria for acceptable client service are laid out. These agreements include client-orientated library services and the enhancement of staff morale (Lakos 1997:4).

The increased emphasis on verifiable service quality also introduced another challenge to academic libraries, namely the measuring or assessment of their services, which amounts to comparing actual with planned performance (Poll & Te Boekhorst 1996:16). Such service measurement needs to be multidimensional to be representative of an academic library's services. Nardini (2001:2) confirms this view: "Good assessment requires different types of data and a full picture of the institution and the marketplace."

Three current approaches to measuring service quality, different but complementary, were identified by Booth (2002:1):

- "top-down" - the organisation's activities are measured against the set standards.
- "sideways" - peer review and benchmarking are the decisive criteria.
- "bottom-up" - the service is measured against client satisfaction.

Peer review is a process in which employees' peers measure their work performance according to specific criteria.

Benchmarking is the comparison of selected performance measures or operational processes against challenging standards that could be "comparisons with the organisation's own history, against key competitors in the industry or against 'best-in-class' performers" (Ehlers & Lazenby 2004:240).

Measuring service quality according to the above and other principles can be objective or subjective, dynamic or static, explicit or derived, absolute or relative, predictive or explanatory. Objective, absolute and explicit service-quality performance measures are preferred in an academic library context, but measurement is much more difficult in a service context than in manufacturing, and Wille (1992:103) suggests the following reasons for this, namely that a service:

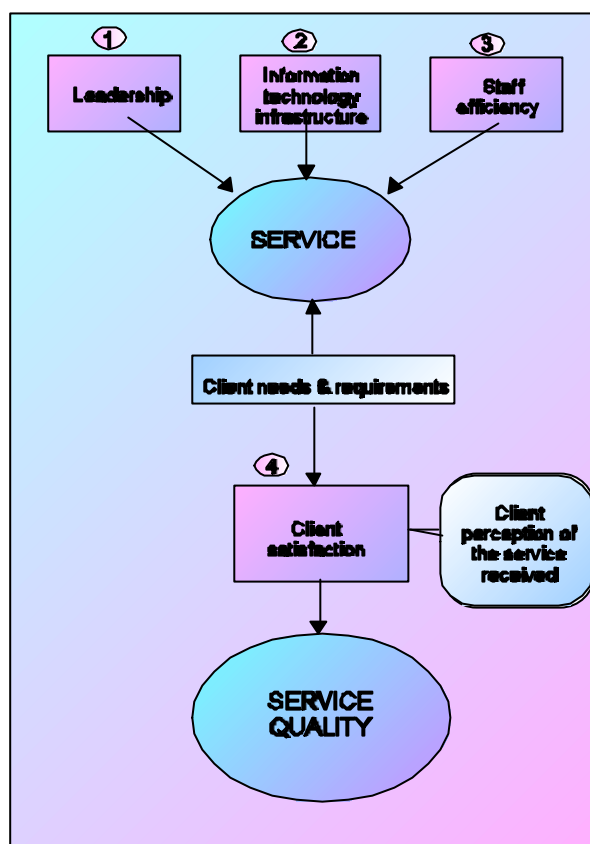
- cannot be stored,
- cannot be scientifically inspected or examined,
- cannot be described before it takes place, because the responses of the persons involved in the service transaction can only be determined in the actual event, and
- cannot be regulated, for example the attitude of an employee at a specific moment.

Clemmer (2004:1) stresses that today's performance-measurement outcomes are the results of yesterday's management decisions. In other words, performance measurement creates **a historical record of the effectiveness of a specific service**.

Figure 2.10 illustrates the four major factors that influence any service, namely:

- First is the leadership of the organisation - strategies identified and implemented by the leadership team will play a crucial role in the service provided by the organisation.
- Second is the information technology available to the organisation, which mainly depends on the network technology infrastructure and the scope of electronic information resources.
- Third is efficiency training of the staff members, which is not a specific guarantee of proficiency, but can lead to desired outcomes if applied correctly.
- Fourth is client satisfaction, which is closely linked to the clients' perception of the service and client confidence in the service.

FIGURE 2.10
FOUR FACTORS INFLUENCING A SERVICE



Source: Adapted from Rohm (2003:4).

In recent studies researchers argue that client perception must be seen as the only factor determining the level of service effectiveness. Pruett (2005:5) distinguishes between a service-orientated academic library (the librarian's perception of clients' needs) and a client-centred academic library (clients' requirements and expectations) and also concludes that client's assessment of service quality is decisive. She says that if "the client does not perceive you as offering quality service you are not."

Library effectiveness studies, which rose to prominence in the 1940s and 1950s, are largely dependent on measurement studies from outside the library and information field to find usable or adaptable measurement techniques. Pritchards (1996:2) comments that Orr was a pioneer in the library and information sector in this regard. He was responsible for the distinction between library quality (the level of service provided) and its value (the level of service results), as well as for identifying four measurement criteria, namely resources, capability, utilisation and benefits. Other researchers refined

performance measurements, for example Childers (1989), Moore (1989), Herson and McClure (1990), Van House, Weil and McClure (1990), and the EN16448 library standards developed by Sumson and Ward (1995).

Traditionally the evaluation of service quality in academic libraries was limited to the assessment of input, process and outputs. When impacts and outcomes became an issue, performance measurements had to be adapted to incorporate these aspects. Input refers to resources such as the library budget, the number of library staff, the collection size and the number of service hours, whilst a process (eg. the cataloguing of information resources) and output (eg. the number of books taken out) includes all the organisation's related activities and tasks with a common envisaged outcome.

Outcomes are the organisation's results and the accomplishments of the academic library in a supportive role in line with the parent organisation's mission and goals (eg. papers delivered at conferences, students graduated and articles published). An impact has to do with the change effected by the organisation in the greater community (eg. unique research problems solving major health issues). Current trends in service-quality assessment focus especially on outcome and impact.

2.8.2 The necessity of measuring service quality

The end product of measurement is a "quantitative picture" gained regarding a product, process, service or organisation. This "picture" helps management to make an informed evaluation about an academic library product, process, service or the library as a whole. According to the traditional librarian the data gathered in this way provided objective facts regarding the efficiency of staff analysed against set standards by the library management, and it played an important role in planning, control and identifying trends.

The emergence of the global community as a reality and the accompanying technological developments brought major changes to the library and information sector. Today the reasons for the assessment of academic library services are identified by Hiller and Self (2004:2) as:

- the increased pressure to be accountable to all stakeholders,
- the need to justify the existence of the academic library,
- benchmarking,
- the changing client profiles, client needs, and information technology,
- the identification of academic library services that are not up to standard, and
- marketing.

Tan and Foo (1999:1) state that the worth of an academic library service is evaluated by the academic community who decides the size of the academic library's budget, which is a major incentive for an academic library to perform service-quality measurement.

Ferguson (2005:1) refers to the report by the Conference Board on Strategic Performance Measurement, and he specifically mentions the finding that organisations which employ performance measurement are much more likely to be leaders in their field. He also highlights the finding that an organisation with a performance-measurement system in place is almost twice as likely to handle major cultural and operational change more successfully than those without such systems.

2.8.3 Performance indicators

A performance indicator is described by Poll and Te Boekhorst (1996:16) as "a quantified statement used to evaluate and compare the performance of a library in achieving its objectives." Although this description is accepted internationally, a performance indicator has other related applications.

Performance indicators can be defined as a description of what is measured. The measurement plays a monitoring or an evaluative role in regard to a specific process, service or system. The data collected and analysed in this way are used to measure progress, to demonstrate accountability, to determine effectiveness and efficiency, to pinpoint problem areas, to indicate if an outcome and/or goal has been accomplished, to determine the extent to which objectives and outcomes have been achieved, to identify benchmarking data, and to allow objective assessment of an organisation's overall performance.

Decision support services take responsibility for performance indicators in most higher-education institute libraries, and the results of these measures are captured in Management Information Systems (MIS). Although measuring an academic library's performance is a given, there is no universal agreement on what must be measured. Usually academic libraries select performance indicators that suit their specific goals, organisational culture and resources. The data collected are seen as necessary for making library management decisions (eg. collection building, improving service delivery and allocating staff) (Beck 2003:1). When discussions revolve around the development of new performance indicators or the use of existing data the participants always agree that whatever performance indicators are chosen, they need to be linked to the academic library's and its parent organisation's strategic plans.

Recently librarians have been seriously debating the traditional input and process performance indicators (eg. collecting data on collections, finances and human resources) (Kyrillidou & Blixrud 2002:4). The use of academic library resources does not provide information on the benefits the library client derives from his or her interaction with the academic library, nor does it generate feedback on the newest technological changes and the impact on an academic library's target group.

Over the years a variety of initiatives were launched to identify specific performance indicators for academic libraries (eg. Academic Library Statistical Norms and the initiatives of the International Federation of Library Associations and Institutes [IFLA]), but there was no one single international set of performance indicators for all academic libraries. This made it very difficult to compare the performance of one academic library with that of another. The development of indicators that will enable academic libraries

to make comparisons were attempted (eg. the Concerted Action on Management Information for Libraries in Europe [CAMILE] projects) (Lakos 1997:5). The implementation of these projects was quite successful when they were limited to similar situations.

All these initiatives to develop performance indicators contributed greatly to the understanding of performance measurement, but the dream to be the one to provide the ultimate internationally accepted guidelines in this regard did not materialise because the research did not differentiate between large and small institutions. It also did not take into account the unique goals and environment of an academic library, a crucial fact in identifying appropriate performance indicators. Minter's view (as cited by Kyrillidou 1996:4) in this regard is expressed in the following words: "Institutional context and administrative vision are two reliable guides to the importance of particular measures."

The importance of performance indicators was emphasised when library standards, incorporated in the ISO 11620 standard on Library Performance Indicators, included 29 performance indicators in three specific areas for measurement, such as client satisfaction, public service (eg. document delivery) and technical services (eg. cataloguing) (Kyrillidou & Blixrud 2002:7).

A performance indicator results in a quantified outcome (eg. a bar chart), or qualitative measure (eg. a client's written complaint), and it indicates a particular situation at a specific time and location. Although many publications give detailed information on the identification of performance indicators, guidelines on implementing the chosen indicators and the analyses of performance measurements, most performance indicators usually do not measure service quality.

2.8.4 Developments in service-quality studies

Brainstorming of appropriate service-quality measurements in academic libraries has been the focus of librarians since the late 1980s. The article of Tan and Foo (1999) sheds light on the theories used as research basis for the development of service-quality assessment measures. The two theories identified by them are the Disconfirmation Theory emerging in the 1970s (comparison between the expectation and perception of the service by a client), and the traditional Systems Theory (aspects

of the library system are under scrutiny, such as the measurement of tangible indicators in regard to inputs and processes that are vital in delivering a successful service) (Booth 2002:2). New developments all had the same argument as a starting point, namely that client perception of the service received is the only measurement determining the quality of service.

Marketing research during the past decade made prominent strides in service-quality measurement, and the most popular measurement, SERVQUAL, laid the foundation for this type of measurement in academic libraries.

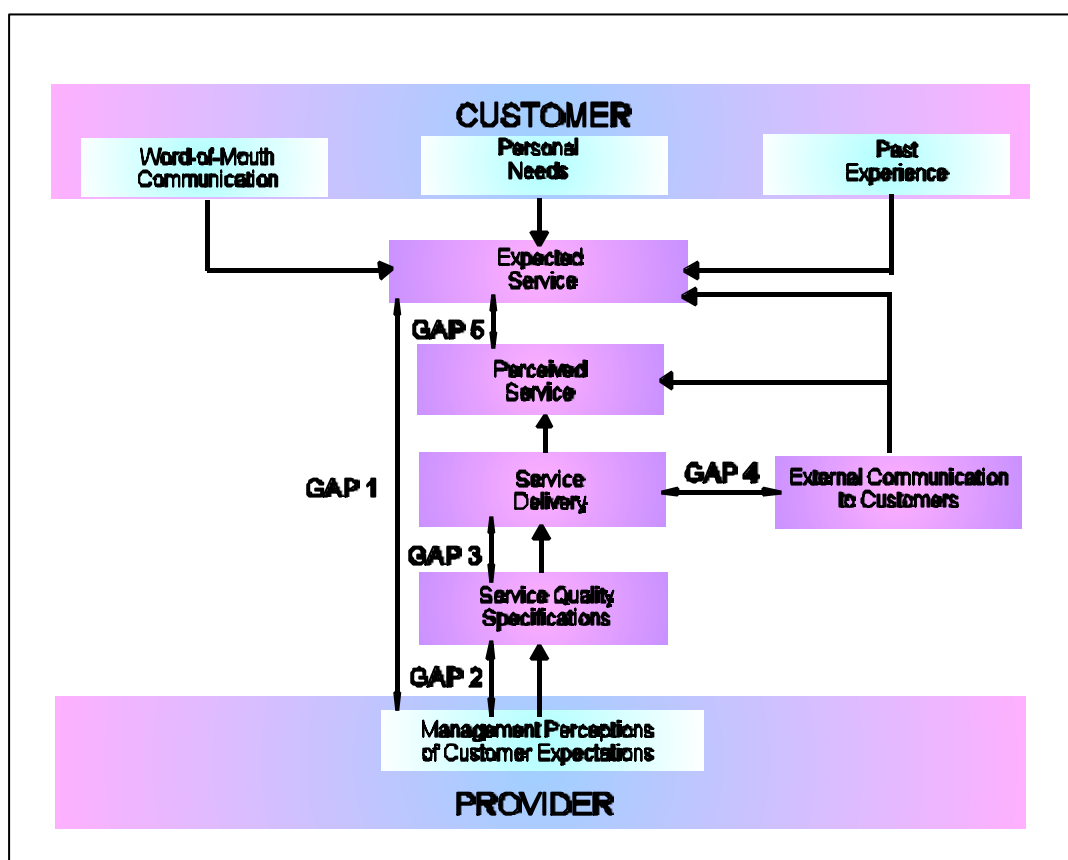
2.8.4.1 *SERVQUAL*

Introduced in the 1980s, SERVQUAL, a business measurement, was applied in a wide variety of service organisations (eg. banking, medical field and the aviation industry). It provided information on clients' minimum expectations and perceptions of a particular service.

SERVQUAL was developed by Zeithaml, Parasuraman and Berry (Nitecki 1997:1) and offered a method to measure service quality when academic libraries started focussing more on their clients. The reason why SERVQUAL stood out at that stage was due to its reliable nature and statistical integrity over years of practical application in the commercial sector.

SERVQUAL is a conceptual model of service quality (see figure 2.11), identifying five potential gaps between expectations and perceptions, both internal and external, of service delivery (Zeithaml, Parasuraman and Berry 1990:26).

FIGURE 2.11
CONCEPTUAL MODEL OF SERVICE QUALITY



Source: Adapted from Zeithaml, Parasuraman & Berry (1990:26).

These gaps or dimensions emphasise the service orientation of an organisation, and the first research results identified ten basic criteria used by clients to evaluate service quality, namely tangibles, reliability, responsiveness, communication, credibility, security, competence, courtesy, knowledge of the client and access (Tan & Foo 1999:3). These ten criteria were later condensed to five:

- Tangibles - the appearance of physical facilities, library staff, equipment and communication materials.
- Reliability - the ability of the library to perform the promised services effectively that is dependably and accurately.

- Responsiveness - how willing are library staff members to serve clients and provide immediate service?
- Assurance - what is the level of library staff knowledge, helpfulness and friendliness, as well as their ability to convey confidence and trust?
- Empathy - is there an emphasis on caring individual attention towards clients?

To determine these gaps a 22-item questionnaire was developed, testing the client's expectations and perception of every item. Research in all industries showed that clients ranked the importance of two of these dimensions consistently, regardless of service context, namely:

- reliability as the most important dimension, and
- tangibles as the least important.

These results were also found in the different academic library services, for example in interlibrary loans, but with one exception, namely in reference services where reliability and responsiveness shared equal importance (Nitecki 1996:181).

Although the emphasis is on the quality dimensions that ideally need to be measured in an academic library to ensure client satisfaction, measurement research studies in academic libraries in this regard showed that Gap 5, the gap between clients' expectations and perceptions of the quality of service, is the most frequently assessed or measured gap, for example Dalton's study (1991) on client satisfaction in regard to subject librarian services in a South African academic library.

As a relatively well-applied and adapted measuring tool in academic and other libraries, SERVQUAL caused certain problems for respondents, such as the completion of a tedious questionnaire, because every question must be answered twice by respondents - first from an expectation viewpoint and then from the perception-of- service viewpoint.

SERVPERF was developed as a simpler measuring instrument, but, although it was based on SERVQUAL's 22-item survey, it never gained the same acceptance as SERVQUAL (Tan & Foo 1999:23). According to White and Abels (1995:40) SERVQUAL is a more sophisticated instrument compared to SERVPERF.

Van Dyke, Kappelman and Prybutok (1997:1), concentrating on the information systems service environment, argue that SERVQUAL presents specific conceptual (eg. the use of one service-quality measure for different business sectors and the ambiguity of the expectations construct) and empirical problems (eg. poor predictive validity). Pitt, Watson and Kavan (1997:1) did not agree with these viewpoints and defended it with well-thought through counterarguments for each statement made by the criticsers. Although they have strong positive views in regard to SERVQUAL, they do acknowledge that further research is necessary.

Testing SERVQUAL in an academic library environment in 1995, 1997 and 1999, the Texas A&M University stated that "the SERVQUAL framework serves as a useful tool for management decision making at the local level", but the researchers' criticism was that the protocol was "less promising as a quantitative tool for simplistic ranking of cross-institutional library performance" (Cook 1999:1). They also stated that more research is necessary to refine SERVQUAL.

2.8.4.2 *LibQUAL+*TM

Modified SERVQUAL instruments were used for several years and revealed the need for a new measurement applicable to the academic library environment. This need was also increased by the emphasis placed on outcomes-based education and outcomes-based and impact evaluation.

In 2000 the Association of Research Libraries (ARL) in collaboration with the Texas A&M University Libraries, developed a library service-quality assessment instrument based on SERVQUAL, called ***LibQUAL+***TM.

*LibQUAL+*TM can be administered by all libraries of all sizes and is based on SERVQUAL. Survey questions cover three service-quality areas, namely:

- “library as place (utilitarian space, symbol, refuge),
- information control (scope, timeliness, convenience, ease of navigation, modern equipment), and
- affect of service (empathy, responsiveness, assurance, reliability)” (Hipps 2003:1).

Originally in 2000 twelve libraries in higher-education institutions participated in the testing of *LibQUAL+™*, which gained popularity with the result that by 2003 three hundred and eight libraries, including university and college libraries, military libraries, public libraries and health-science libraries in the USA, Canada, UK and the Netherlands, were applying this service-quality instrument. In 2003 the *LibQUAL+™* survey was available in American English, British English, Dutch and Canadian French. This resulted in *LibQUAL+™* being culturally relevant and easily understood, although the *LibQUAL+™* team made very sure that the end-product of the *LibQUAL+™* survey in other language versions stays “conceptually equivalent to the original American English survey” (Hipps 2003:2).

The goals of *LibQUAL+™* are to:

- promote library service excellence,
- help libraries to gain qualitative data on their clients’ perceptions of library service quality,
- capture data and analyse client responses systematically over time,
- provide data that are suitable for comparison,
- pinpoint best library-service practices, and
- help library staff to better their analytical skills in interpreting and applying statistical data (*LibQUAL+™* 2005:1).

The object of using *LibQUAL+*TM is to give an academic library client the opportunity to tell the library how to improve services.

The development of performance indicators and measurements is extremely difficult in a rapidly changing library environment. The *LibQUAL+*TM team had to take into account the development of technology and its impact on the library and information science environment.

Today *LibQUAL+*TM is a web-based survey run by the ARL with more than 500 libraries participating. It requires minimum technical expertise from the librarian. Respondents complete the questionnaire via e-mail and the data capture and analyses are done by the ARL. The library receives reports on their clients' needs, perceptions and minimum expectations of library services.

In July 2003 a new feature, "interactive data analysis" was made available to libraries participating in *LibQUAL+*TM with the result that librarians could generate their own graphical representations based on their survey data (*LibQUAL+*TM 2005:1).

2.8.4.3 European Foundation for Quality Management Excellence Model (EFQM Excellence Model)

Service-quality assessment in the European commercial world also attracted much attention in the 1980s.

The European Foundation for Quality Management (EFQM) introduced a self-assessment tool called the Excellence Model, which was based on the practical experience of European organisations. The model can be used in small and large organisations, as well as in the private and public sectors (European Foundation for Quality Management 2005:1).

The reason for creating the **EFQM Excellence Model** was: “to stimulate and assist organizations throughout Europe to participate in improvement activities leading ultimately to excellence in customer and employee satisfaction, influence society and business results; and to support the managers in European organizations in accelerating the process of making Total Quality Management a decisive factor for achieving global competitive advantage” (QPR Software 2005:1).

This model is the most widely implemented organisational framework in Europe (more than 20 000 participating organisations). In 1992 it became the basis for The European Quality Award, a sought-after prize for success in the national and regional business environment. It is described as a “non-prescriptive framework”, recognising that sustainable excellence can be achieved from different angles.

The EFQM Excellence Model operates on eight fundamental principles, namely:

- leadership and constancy of purpose (the behaviour of an organisation’s leaders will set the stage for the organisation’s direction and a common goal for its employees to follow),
- people development and involvement (the organisation’s employees will reach their full potential in an environment with shared values and a culture of empowerment),
- client focus (the client must be seen as the final arbiter of an organisation’s product and service),
- management by processes and facts (reliable information is necessary for systematic management and decision making),

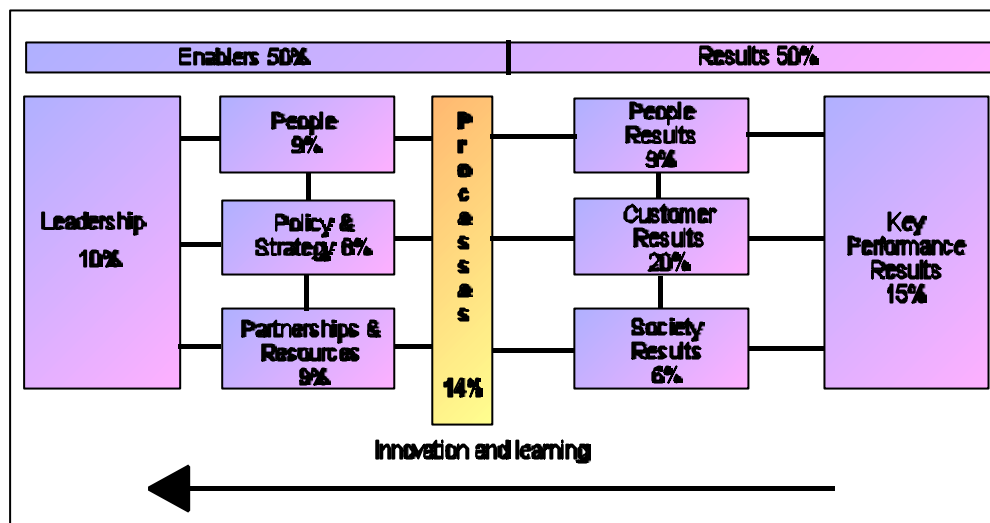
- partnership development (good mutually beneficial relations with partners enhances an organisation's effectiveness),
- public responsibility (an ethical approach to the community is important),
- results orientation (all stakeholders' needs must be kept in mind), and
- continuous learning, improvement and innovation (continuous learning, innovative thinking, improvement orientation and sharing of knowledge as part of the organisation's culture maximises an organisation's performance) (Teal Consulting 2005:1).

According to the EFQM this model must be regarded as a practical tool that can be used in a variety of ways, namely:

- self-assessment instrument,
- benchmarking tool,
- a guide to identify necessary improvements,
- a dictionary supplying common vocabulary,
- a way of thinking, and
- a management system structure (European Foundation for Quality Management 2005:1).

The EFQM Excellence Model is based on nine criteria and thirty-two subcriteria with a prescribed weighting. These criteria are crucial for any organisation's progress towards excellence. It is usually presented in the following graph with its arrow indicating the dynamic character of the model (figure 2.12):

FIGURE 2.12
THE EFQM EXCELLENCE MODEL



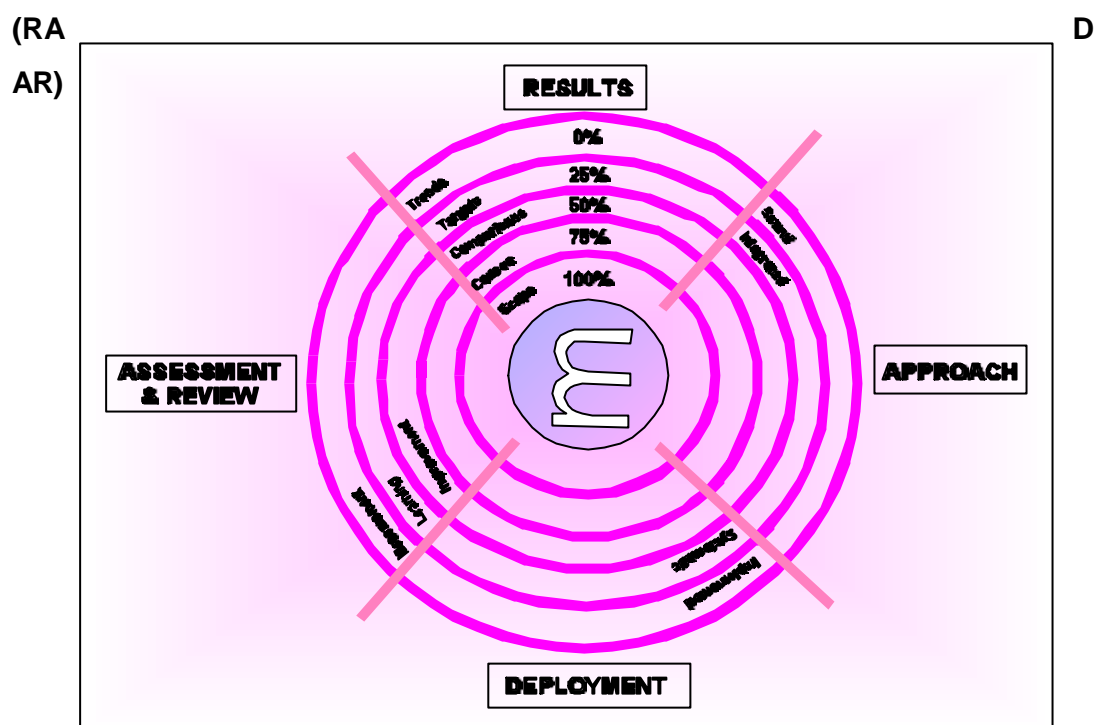
Source: (European Foundation for Quality Management 2005:1).

Five of the nine criteria are described as “Enablers” (what is put in place by the organisation), while the other four are called “Results” (what is achieved by the organisation). There is an interaction between the “Enablers” and the “Results”. The “Enablers” are responsible for causing the “Results”, whilst the “Results” give information on how “Enablers” can be improved.

To assess an organisation the RADAR method is applied and “Results, Approach, Deployment, Assessment and Review” are taken into account. A graphical representation of RADAR is showed in figure 2.13.

FIGURE 2.13

RESULTS, APPROACH, DEPLOYMENT, ASSESSMENT AND REVIEW



Source: Bhatt (2004:7).

The premise of the EFQM Excellence Model is the following:

“Excellence results with respect to Performance, Customers, People and Society are achieved through Leadership driving Policy and Strategy, that is delivered through People, Partnerships and Resources, and Processes” (European Foundation for Quality Management 2005:1).

The EFQM Excellence Model is continually reviewed and the latest model was updated in 2003. Barrionuevo and Pérez (2001:1) describes how the EFQM Excellence Model was used with good results as a base for the assessment of academic libraries in Andalusia, Spain. It can also be seen as a framework for improvement and change (Sandbrook 2001:83). Alonso Arévalo (2003:1) reports that the application of the EFQM Excellence Model as assessment tool worked very well in the assessment of the

archival and academic library services of the University of Salamanca in Portugal.

2.8.4.4 The Library and Information Sector Improvement Model (LISIM)

In January 1999 the British Library Research and Innovation Centre started an investigation into self-assessment for public library services, that can also be used in academic libraries (Kinnell, Usherwood & Jones 1999:33). Four quality management approaches were examined in order to maximise each one's strong points in a new model that is applicable to the library and information sector, namely:

- Charter Mark

Charter Mark is the British Government's set of national client service standards. These standards are based on clients' desires and they promote continuous improvement (United Kingdom Cabinet Office 2005:1).

- Investors in People (IIP)

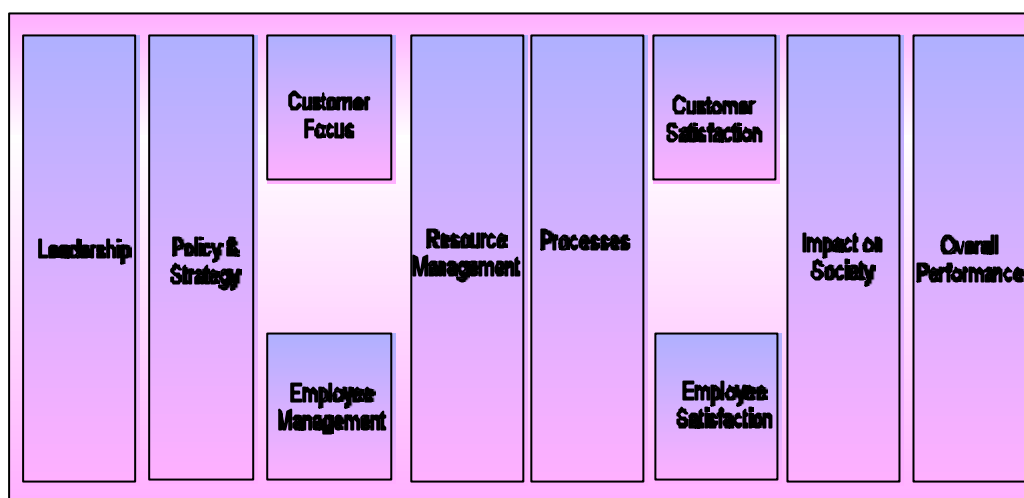
Investors in People Standard was developed in 1990 and can be described as a business instrument to enhance an organisation's performance through its staff members (Investors in People 2005:1).

- ISO 9000, and
- EFQM Excellence Model.

The self-assessment model for organisations in the library and information sector was called the **Library and Information Sector Improvement Model (LISIM)**, which offers "a flexible framework for those services seeking to increase the efficiency and effectiveness of the way in which their services are provided to disparate groups of stakeholders" (Kinnell, Usherwood & Jones 1999:133).

Figure 2.14 shows the components of the LISIM model.

Figure 2.14

LIBRARY AND INFORMATION SECTOR IMPROVEMENT MODEL (LISIM)

Source: Evans (2000:6).

The LISIM model operates on the following eight principles, namely:

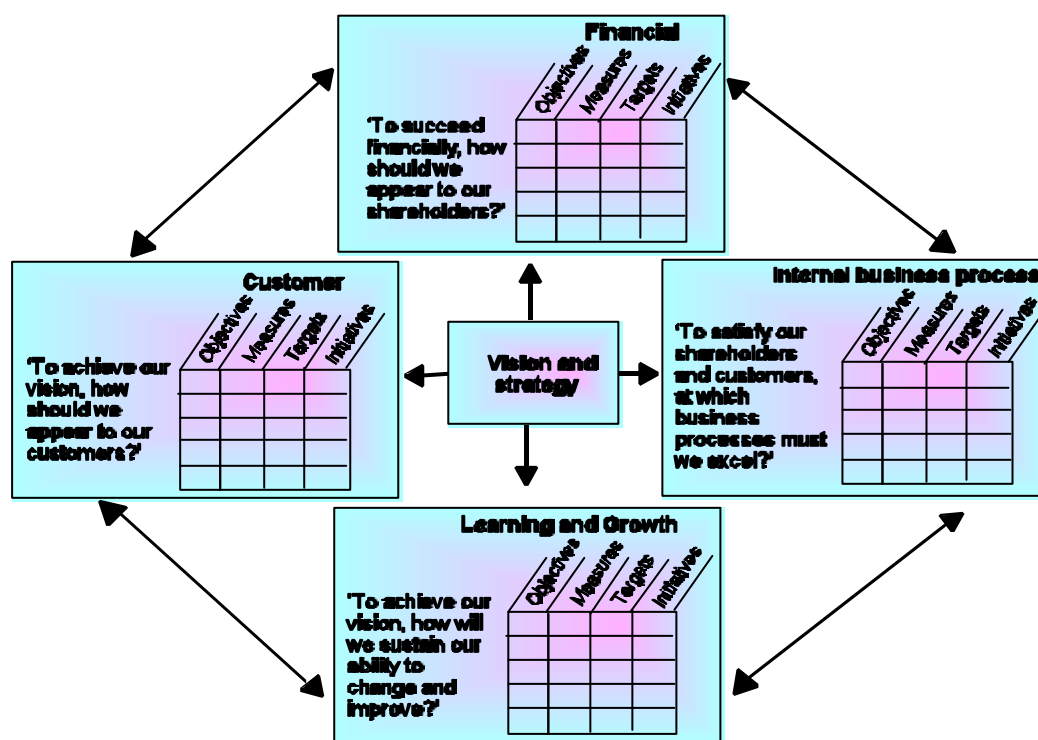
- LISIM is non-prescriptive in regard to the assessment process used by an academic library.
- There must be a consistency of purpose throughout the assessment process.
- Continuous improvement must be an integral part of an academic library's culture.
- Key result areas must be benchmarked.
- The academic library must be managed according to relevant and accurate facts.
- The leadership of the academic library must be visible and visionary.
- The stakeholders' expectations and needs are paramount.
- There must be a commitment to staff development, satisfaction and involvement in the academic library's success (Evans 2000:6-7).

2.8.4.5 Balanced Scorecard

The Balanced Scorecard, a management system, was developed by Kaplan and Norton of the Harvard Organisation School in 1992 and adopted by numerous businesses and some academic libraries (eg. the national library of Denmark, called the Royal Library, which implemented it in 2000) (Krarup 2004:1). This system identifies key metrics across all levels of the academic library, helping the library to clarify its strategies, which it then translates them into action and provides performance feedback by identifying a set of measures that will give a picture of the future performance of the academic library (Pearce & Robinson 2003:158-159).

Managers use the Balanced Scorecard to evaluate their organisation from four perspectives, namely financial performance, client knowledge, internal business processes, and learning and growth (see figure 2.15). Each of these perspectives is represented by three to five measures.

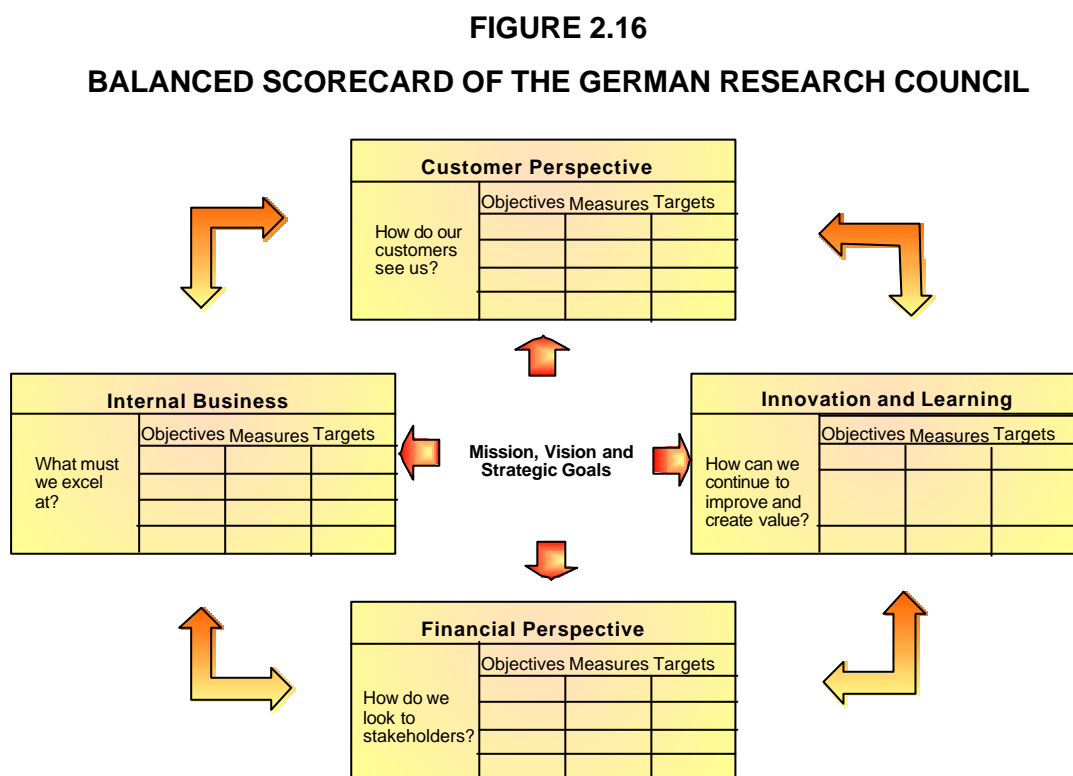
FIGURE 2.15
BALANCED SCORECARD



Source: Kaplan & Norton (1996:76).

In 1999 the German Research Council (DFG) sponsored a German research project in regard to an integrated quality management system for academic libraries. Three large libraries participated, namely the University and Regional Library in Münster, the Bavarian State Library in Munich, and the State and University Library in Bremen. The project was based on the Balanced Scorecard and “the planning perspective of an institution (mission, strategic vision and goals)” was developed into a performance indicator system that covers the four perspectives of the Balanced Scorecard (Cribb & Hogan 2002:2; Poll 2001a:2).

The German model deviates from the original Balanced Scorecard of Kaplan and Norton in giving the client perspective the primary position instead of the financial perspective (see figure 2.16).



Source: Cribb & Hogan (2002:2).

Each organisation can choose its own performance indicators in building a Balanced Scorecard. For example, at Bond University, Australia’s first private university established in 1987, the objectives for “the customer perspective” were identified as:

- client satisfaction,

- “provision of ‘value-added’ educational services,
- superior employment outcomes for graduates, and
- improved relationships with parents, employers, alumni and other stakeholders” (Cribb & Hogan 2002:5).

These objectives with their chosen measures and targets are described in table 2.4.

TABLE 2.4
BOND UNIVERSITY’S CUSTOMER PERSPECTIVE

Customer Perspective		
Objectives	Measures	Targets
To support teaching, learning and research needs of customers	Customer satisfaction as measured by the Customer Surveys; suggestion box comments; focus groups and other input from various customer groups	Improved
To enhance communication and collaboration with the academic staff and students	Comments and suggestions received	Maintain
To ensure customers’ awareness of the quality, relevance and appropriateness of information resources	Number of irritants or gaps between expectations reported	Monitor and reduce
To enhance the Library’s contribution to the University’s marketing, recruitment and alumni activities	Library staff representation on University-wide groups; library staff understanding of university’s strategic directions, and the University community’s awareness of the value the Library adds to their activities	Maintain or increase

Source: Cribb & Hogan (2002:5).

The use of the Balanced Scorecard by the Bond University Library was a positive experience and the authors felt that the “*what, why, how and how well*” aspects of its strategic plan and how this plan complements and supports the University’s Strategic Plan” was well described by the Balanced Scorecard (Cribb & Hogan 2002:8).

The University of Virginia Library also implemented the Balanced Scorecard and found that it improved their statistical data collection, helped with the clarification of their organisational values and ensured a focus on assessment (Self 2003:1).

Poll (2001b:709) in her article “*Performance, processes and costs: managing service quality with the balanced scorecard*” expresses the view that the Balanced Scorecard goes beyond LibQUAL+™ and needs to be given more attention in the library and information sector.

2.8.4.6 Electronic service-quality assessment

Today change in the electronic capacity of academic libraries includes gateways or direct access to full-text journal and monograph databases, and integrates access to electronic information resources through the Internet.

Different authors tried to define the term “digital library”, but some felt that the term is too ambiguous to use. According to Borgman (1999:227) the term “digital library” can be defined in two ways, namely from a technological or a social viewpoint. Technologically he defines the “digital library” as “a set of electronic resources and associated technical capabilities for creating, searching and using information” (Borgman 1999:234). In contrast with this description, he also states that a “digital library” has a social connotation: “digital libraries are constructed, collected and organized, by (and for) a community of users, and their functional capabilities support the information needs and uses of that community” (Borgman 1999:234).

To sidestep this problem other terms were created, namely the “electronic library”, the “e-library”, the “virtual library”, or the “networked library” (Brophy & Wynne 1997:1). Oppenheim and Smithson (1999:97), as well as Rusbridge (1998:1), view the “digital library” as a “hybrid library”, an academic library in transition between a traditional library with its hard-copy resources and a “digital library” with its electronic information resources. Some researchers do not support this view, but see the “digital library” as

the library of the future (Leggate 1998:103; Pinfield 1998:41).

According to Bertot, (et al) (2004:1) “**digital libraries**” “provide services and resources in a hybrid operating environment: there is the physical academic library and there is the electronic one.”

Library standards already exist for the digital library, such as those developed by the National International Standards Organisation (NISO), a non-profit organisation founded in 1939 and accredited by the American National Standards Institute (ANSI), that endeavours to reflect international needs.

NISO (2005:1) defines the scope of electronic areas in the academic library as:

- “various forms of electronic library services,
- various forms of electronic information resources, and
- various forms of use of electronic services.”

Electronic service-quality assessment methods cannot be ignored as the digital library is already a current reality and an undeniable role player in the future global community. The development of the digital library is also bringing new challenges to performance measurement and the identification of appropriate performance indicators (Young 1997:1).

Existing non-digital service-quality assessment measures cannot be used to measure the digital library service quality due to the nature of electronic information resources and services. Electronic information resources have no physical form and limits. For example “as abstract and indexing, full text, and other databases begin to merge into complex database products, it becomes increasingly difficult to differentiate between them” (National Information Standards Organisation 2005:1).

McClure and Lopata (1996) were the pioneers in regard to digital library service-quality

assessment. Due to the fast changing technology many projects to develop appropriate assessment measures for the “electronic library” have sprung up in recent years.

LibQUAL+™’s survey adaptation to include the electronic capacity of the emerging digital library is named e-QUAL, which is devised to assess the digital-library service quality from a client’s point of view, based on client expectations and perceptions of digital library service quality.

Examples of other research projects include:

- EQUINOX 1998 - 2000

The European Commission (EC) played an important part in defining performance indicators for the traditional, book-based library, and it supported numerous projects in this regard (eg. EQLIPSE, MINSTREL and DECIMAL). EQUINOX builds on the recommendations of the earlier EC projects. The purpose of EQUINOX was to identify performance indicators for electronic library services that can complement the existing traditional library performance indicators, and to build an integrated software-based decision-support instrument. Examples of these performance indicators are the percentage of information requests submitted electronically, and client satisfaction with electronic library services (Brophy, [et al] 2000:1).

- EQLIPSE 1995 - 1997

The Centre for Research in Library and Information Management (CERLIM) of the Manchester Metropolitan University, was responsible for EQLIPSE, an EC funded research project, focussing on the specification, development and validation of “an open IT based system to support quality management and performance measurement in libraries of all types” (Centre for Research in Library and Information Management 2005:1).

Measuring the “digital library” is an aspect of service quality that is still in the process of development. Identifying performance indicators is not always easy in the fast changing environment of information technology.

2.9 SUMMARY

In retrospect many new measurements of service-quality assessment have come into use since the 1980s. The most important of these for the library and information sector (noted in the literature) is the change over from measuring input and process indicators to outcome and impact measurements. The development of LibQUAL+™, based on SERVQUAL, the implementation of the EFQM Excellence Model, and the Balanced Scorecard in academic libraries, lifted service-quality measurement to a new level of library management and ensured relevant and accurate accountability towards all the library stakeholders. Major impacts of the changing information technology environment have also necessitated radical rethinking of service quality and performance indicators for the emerging “digital library”.

Inventory control will be examined in the next chapter, while in the chapter there after the actual impact of inventory control on an academic library’s service quality will be presented, discussed and synthesised.

CHAPTER 3

INVENTORY CONTROL OF INFORMATION RESOURCES

3.1 INTRODUCTION

The concept of service quality was explored in chapter 2 of this study. An overview was given of service quality in an academic library with reference to the development of academic library performance measurements in historical perspective (including illustrative measurement models).

The academic library cannot be described in isolation, but must be seen in the context of the parent organisation, namely the higher-education institution. Any changes that the parent organisation faces, have a direct impact on the academic library. In chapter 3 the higher-education environment is briefly explored and particular attention is given to the higher-educational situation in South Africa.

The concept of inventory control of information resources is also discussed in this chapter. A short overview of inventory control and its data collection methods is presented.

3.2 THE HIGHER-EDUCATION ENVIRONMENT, WITH SPECIFIC REFERENCE TO THE SITUATION IN SOUTH AFRICA

Van Damme (2000:12) notes quality assurance in higher-education institutions developed in the 1980s due to the “neo-liberal” and “neo-conservative” preoccupation with:

- budgetary constraints,
- possible declining standards of education,
- lower staff performance levels,

- increased pressure for accountability from all stakeholders, and
- the 'value-for-money' approach to quality.

Other factors that impelled the development of quality assurance in higher education were student exchange programmes and close cooperation among international higher-education institutions (Ngwenya 2003:23).

The need to survive in this new borderless environment and the fact that it became a commodity in 1995 according to the General Agreement on Trade and Services (Ascher 1997:2) compelled education to become much more focused on purpose, responsibility and quality (Bamba 1997:17; Jacobs 1997:88; Yeboah 1997:239). This global trend in higher education is evident from the creation of international organisations for the development of higher-education standards (eg. the International Network for Quality Assurance Agencies in Higher Education [INQAAHE]).

This preoccupation with higher-education standards became evident in South Africa during the early 1990s (Noruwana 1993:38).

3.2.1 The higher-education environment in South Africa after 1994

In 1994 the African National Congress (ANC) government of South Africa came into being and was faced with the onerous task of transforming the political, social, economic, educational and cultural institutions of South Africa in order to correct the imbalances and inequities of the past. Accordingly, in the education sector a National Commission of Higher Education was created to research and develop a new national higher-education strategy which was subject to the influence of several key factors, namely:

- (1) The high value placed on equity in and access to education

Before 1994 the education system was characterised by selective access to differentiated education. The existing inequities in South Africa were made much worse by this situation. By enshrining the principle that the education is a fundamental right of every South African the Constitution of South Africa paved the way for the development of new structures and systems to rectify this imbalance.

The Constitution also called for increased access to further tertiary education. The current concern voiced by members of the South African Students' Organisation (2004:2) is that South African education is becoming too expensive and therefore excludes people on the grounds of financial incapacity.

(2) The fragmentation of the education system

Bantu Education, imposed by the apartheid government in the mid-1950s, reflected the divided and elitist education system of the day. In the late 1980s South Africa was greatly at odds with global trends and developments, specifically in:

- its exclusionary character,
- its rather rigid differentiations between higher-education institutions in the sense that colleges and technikons were regarded as inferior to universities, and
- its inability to keep up with the demands of globalisation (Kraak 2001:36).

The new government of South Africa was adamant in its resolution to redress these failings.

(3) Expertise needed for socioeconomic development in South Africa

The result or end product of education is very important in token of which Perry (1994:35) worded the desired outcome of teaching and learning as follows:

“It cannot be said too often that the real quality of higher education must be measured in terms of what students know, understand and can do at the end of their higher education experience. These are unquestionably the criteria used by employers and by society at large.”

In South Africa there was a constant discrepancy between higher education's end results and the needs of the current and future economy (Kraak 2001:36). This was a serious problem, and in 2001 specific legislation was passed that initiated a process to address this situation.

A variety of quality evaluations in higher education existed since the first South African university made its appearance in 1873 as the University of the Cape of Good Hope (precursor of the University of South Africa). A coordinated national effort in higher-education quality measurement only became a reality when the South African Universities' Vice-Chancellors' Association (SAUVCA) was established by the Committee of University Principals (CUP) in 1987 (Ngwenya 2003:37).

In the present context of higher education in South Africa quality assurance is driven by the government. This is a global phenomenon (Subotzky 1997:102). The South African government's educational views are expressed in its education policies which have been given formal substance by the Higher Education Act of 1997. The Council on Higher Education (CHE) was formed under this act, and in turn established the Higher Education Quality Committee (HEQC) which is closely linked to the South African Qualifications Authority (SAQA), *The National Plan for Higher Education* (2001) and the Department of Labour's *Human Resource Development Strategy for South Africa* (2001) (Higher Education Quality Committee 2002:1).

The South African government keeps the national education strategy on track by means of financial incentives and programme evaluation and/or SAQA accreditation.

3.2.2 Current education policies and guidelines

Theoretical education policies for higher-education institutions in South Africa are contained in:

(1) The National Plan for Higher Education

This plan derives from the strategic framework for the reconstruction of higher-education institutions to meet the demands of the 21st century. The main factors addressed in this plan are:

- the need for graduates who can be employed to assist socioeconomic development in South Africa,
- equity and diversity in the South African higher-education system,
- research, and
- transformation of the organisational structure of the higher-education system (Asmal 2001:1).

The National Plan outlines the framework and provides the mechanisms for the process of transforming the higher-education institutions specified in *Education White Paper 3: a programme for the transformation of higher education* (1997). The plan highlights factors in need of change. For example:

- the rate of participation in higher education to be increased from 15% to 20%,
- the rates of participation in specific fields of study (envisaged rates are 49% in the humanities, 26% in business, 25% in commerce, 40% in science, 30% in engineering, and 30% in technology),
- alignment of the demographic composition of learners with that of the population at large, and

- alignment of demographic composition of tertiary teaching staff with that of tertiary learners.

The National Plan emphasises the crucial role of higher-education institutions in establishing an information society in South Africa through skills development and research (National Plan for Higher Education in South Africa 2001).

Specific higher-education institutions are currently being merged to redress racial fragmentation and improve the administrative capacity, provision of human resources and financial viability of higher-education institutions. The improvement of these factors under the National Plan was the first step towards dismantling the rigid structural differentiation of the apartheid government's education system.

This resulted in three types of public higher-education institutions in South Africa, namely:

- traditional universities,
- universities of technology and technikons, and
- comprehensive universities (see table 3.1).

TABLE 3.1
PUBLIC HIGHER-EDUCATION INSTITUTIONS IN SOUTH AFRICA

Traditional universities	Universities of technology and technikons	Comprehensive universities
North-West University Rhodes University University of Cape Town University of Fort Hare University of the Free State University of KwaZulu-Natal University of Limpopo University of Pretoria University of Stellenbosch University of Venda for Science and Technology University of the Western Cape University of the Witwatersrand	<u>Universities of technology:</u> Cape Peninsula University of Technology Central University of Technology Durban Institute of Technology Tshwane University of Technology Vaal University of Technology <u>Technikons:</u> Mangosuthu Technikon	Nelson Mandela Metropolitan University University of Johannesburg University of South Africa University of Zululand Walter Sisulu University for Technology and Science

Source: Websites of individual higher-education institutions; Sedgewick (2004:1-7).

Traditional universities offer a wide range of degree programmes at undergraduate and postgraduate level. The minimum admission requirement is the National Senior Certificate awarded at the end of the secondary school career. Universities of technology and technikons focus on post-secondary programmes (usually applied disciplines such as health sciences) leading to diplomas and certificates. Comprehensive universities came about as a result of merging certain traditional universities with technikons. These institutions concentrate on programmes and degrees in the traditional arts and science disciplines, including those offered by technikons and universities of technology.

(2) The Higher Education Act (Act 101 of 1997)

This statute can be described as a policy document aimed at regulating higher education with a view to creating a single coordinated higher-education system for South Africa. It is directly responsible for the establishment of a Council of Higher Education and public education institutions, including the appointment and determining of independent assessors' functions, registration of private education institutions, quality assurance and quality promotion (Higher Education Act [Act 101 of 1997]).

(3) The South African Qualifications Act (Act 58 of 1995)

This act introduced an integrated approach to education and training and prepared ground for the establishment of SAQA, which in turn was given the responsibility to develop and implement a National Qualifications Framework (NQF) for South Africa. The aims of the NQF (outlined in Section 2 of the Act) are:

- "Integrate education and training and enhance the quality thereof.
- Create an integral national framework for learning achievements.
- Facilitate access to, and mobility and progression within, education, training and career paths.

- Accelerate the redress of past unfair discrimination in education, training and employment opportunities.
- Contribute to the full personal development of each learner and the social and economic development of the nation at large” (Mbanguta 2002:40).

This includes the emphasis on high quality education and training for all, an outcomes-based approach to education and training, and recognition of prior learning.

(4) Education White Paper 3: A programme for the transformation of higher education.

This document deals with the most critical challenge facing higher education in South Africa, namely redressing past inequalities and transforming the higher-education system to accommodate the new social, economic and business perspective. According to this document higher- education institutions need to be more accountable for the spending of public funds, more transparent, more concerned with catering for the interests and needs of society, and prepared to cooperate with government, other higher-education institutions and society. The paper focuses on two areas, namely the development of a national higher-education plan and a three-year institutional plan of action.

3.2.3 Academic libraries in South Africa after 1994

In South Africa where new legislation brought major changes to address the inequalities of the past, academic libraries are confronted with the following increasingly critical issues:

- the new national education strategy and policies,
- new visions and missions aligned with the new national education strategy and geared towards the survival and expansion of services,
- transformation process,
- an increasing diversity of educational possibilities and opportunities,

- emphasis on life-long learning,
- changing external client expectations in a new South Africa,
- transparency and accountability, including the demand for equitable, high-standard library services for all learners in urban and rural areas,
- seeking innovative ways to support the learner, especially by addressing the increasing need for library resources and services at locations other than the main campus and/or existing branch libraries, and the learning opportunities that a changing technological environment can create, and
- personal development requirements of academic library staff with specific reference to familiarity with legislation affecting the position of academic libraries in relation to the issue of redressing inequities.

A merger of higher-education institutions in South Africa that took place during 2004 resulted in a comprehensive university comprising the University of South Africa, Technikon South Africa and the distance-education section of Vista University, called Vudec. This combined organisation operates as the University of South Africa, and the academic libraries of the merged organisations had to deal, and are still dealing with the consequences of the merger (eg. new library policies to be developed and library catalogues to be integrated).

The new outcomes-based education system and the competency-based approach to learning in South Africa accentuate the learner's knowledge, ability to apply skills and a positive attitude towards lifelong learning. This emphasis "requires a shift in focus from the teacher's knowledge to the student's understanding and capabilities. This shift in focus leads to a new perspective on the development of quality in the academic enterprise" (Smith 2000:1). It also compels the academic libraries to change their "content view (books, subject knowledge) to a competency view (what students will be able to do)" (Smith 2000:3).

South African academic libraries provide important research support for academics who need to develop new outcomes-based learning programmes; consequently collaboration is necessary to develop a high-quality training programme.

All academic libraries, including those in South Africa, are confronted with major changes in technology and the resultant possibilities for information retrieval, for example the development and rapid progress made with the provision of electronic databases and full-text information. It is the academic library's responsibility to manage this information revolution (Fuegi 1999:2). Management of electronic resources entails a continuous maintenance process as titles are added to or removed from databases, as well as electronic preservation.

Many of the clients of South African academic libraries, like academic library clients in other countries, are seasoned Internet users (Lippincott 2004:1) who routinely search for information on the Web and therefore expect academic libraries to be commensurately conversant with the process of providing electronic access to information resources.

In South Africa, academic libraries also have to deal with the fact that there is no equal Internet access every where available. Some clients do not have Internet facilities and it hampers them in regard to online-learning.

Another serious challenge for academic libraries is the desperate need of disadvantaged learners for information-literacy instruction that will place them on an equal footing with their more privileged peers. The required instruction includes identification of the information need, knowing how to find and select appropriate information, and understanding the research process. To be information literate today means being able to function in an information-rich context.

Budgets of academic libraries in South Africa are more restricted, especially where an institution does not conform to governmental and/or accreditation requirements. Electronic information resources are very expensive and academic libraries need to prioritise more carefully to ensure that they keep to their budgets but can nevertheless deliver a significant electronic service. Pricing of electronic information resources has not been stabilised and can even exceed the cost of its printed counterpart (eg. e-books on NetLibrary) (Pinfield 2001:1-2).

The emergence of electronic information services poses a challenge to academic library systems and academic library website developments. For example academic library websites in South Africa today are search tools in their own right, as well as gateways to further information resources elsewhere on the Internet. Pinfield (2001:3) found that the most important challenge involved in providing easy online access to the variety of data type available in electronic information resources was that of integrating such resources (eg. sound, graphic presentations, moving-image information).

Staff members who work in South African academic libraries are right in the middle of this fast-changing library environment. They are not only required to conform to South Africa's new education system, but also to adapt to and function in an ever changing and increasingly sophisticated electronic environment, to which end they must be willing to undergo training and retraining from time to time.

The ability to be professional and to deliver trustworthy quality library services on time in a dynamic, innovative and revolutionised environment is the ultimate challenge for academic libraries in South Africa in the higher-education field.

3.3 INVENTORY CONTROL IN PERSPECTIVE

Inventory control refers to the verification of the total stock held by a specific organisation, and it takes many different forms, depending on the nature of the organisation. For retail or wholesale businesses the most important inventory is merchandise on hand, available for sale. For hospitals, it includes food, drugs, and medical supplies. In an academic library, inventory control focuses on the organisation's information resources (physical and electronic, paper or other material, eg. microfiche), which are the core business of an academic library and information centre. Although the basic principle of verifying an item is present in inventory-control exercises of all institutions, the spirit behind this activity in an academic library and information services context differs drastically from that behind similar exercises in other institutions (Gupta 1990:28). Information resources are academic library assets and, as such, need to be kept safe and available for use.

The term "inventory control" has synonyms such as "inventory", "inventory taking", "stocktaking", "stock verification", "stock checking", "stock inspection", and "book count."

The Oxford English Dictionary (1961:999) defines stocktaking as “a periodical examination, inventorying, and valuation of all the stock or goods in a shop, warehouse, etc.”

For this study, the term “**inventory control**” is defined as the process and activities of establishing the physical presence of all information resources in an academic library for which that library has custody and is legally responsible. It must be kept in mind that inventory control includes information resources that are not available on the shelf, for example items borrowed by clients, or items in transit between the main academic library and its branch library.

3.3.1 A brief historical overview

During the 1970s and the early 1980s inventory control of library information resources, especially books, entailed an in-depth examination undertaken by a wide variety of libraries (eg. school libraries, public libraries, and academic libraries). Haka and Ursery (1985:169) described the viewpoint expressed at that stage by librarians regarding verification of books in large academic libraries:

“Comprehensive inventories are seldom undertaken in large academic research libraries because it is believed that the benefits derived do not justify the costs incurred.”

Since a large academic library was seen as a collection of 100 000 books or more in those years (Kohl 1982:82) complete inventory control in large academic libraries was basically non-existent. Haka and Ursery (1985:169) also pointed out that “commonly held estimates of the costs involved are extravagant and that the benefits are often understated.”

An annual audit of a South African university is required in terms of the Companies Act (Act 61 of 1973) of South Africa. However, an academic library in South Africa can comply with this law without doing annual inventory control of its information resources. The decision to undertake inventory control of information resources is usually the prerogative of the particular academic library’s management. This practice is not only restricted to South African academic libraries, but is found to be current in many parts of the world. An exception is India, where academic libraries are subjected to inventory control every five

years (Gupta 1990:90).

The reasons why inventory control of information resources in academic libraries is included in or excluded from the annual internal audit are given as follows in the context of case studies:

- Bluh (1969:367) writes that the management of an academic library is often hesitant to take on the extra burden of stocktaking because of a shortage of professional staff.
- It is commonly believed that the cost of stocktaking is not worth the results (Chandel & Walia 1993:108, DiCarlo & Maxfield 1988:345).
- The reason for inventory control in the Houston Public Library is worded as follows: "The library had taken its last complete inventory in 1924 and partial inventories in 1934 and 1943. But by 1968 staff and user complaints about the accuracy of the public card catalog led the library to consider the possibility of taking the first complete inventory in fifty years" (Clark 1974:350).
- In 1975 inventory control was undertaken in the University of Texas Health Sciences Center Library in San Antonio to validate a conversion to machine-readable records (Bowden 1977:445), while an inventory at the University of Guelph, Ontario was conducted to test their 3M detection system, installed in 1972 (Cunliffe 1977:72).
- Inventory control can be used to determine conservation needs, as well as "insurance valuation and space planning considerations..., especially in libraries where the total volume count is suspect" (Carter & Benemann 1986:264).
- Emery (1990:2) gives detection of misplaced or misshelved items as a reason. However, the most important motivational stimulus for any academic library worldwide to undertake inventory control of its information resources is the possibility of significant book losses (Burrows & Cooper 1992:1; Jayaram 1987:50; Kaske 1976:6; Lowry 1982:73; Moore 1978:1).

The academic libraries of universities in South Africa have different viewpoints as motivations for conducting inventory control (see table 3.2).

TABLE 3.2
INVENTORY CONTROL IN SOUTH AFRICAN ACADEMIC LIBRARIES

University	Most recent year in which inventory control was done	Frequency of inventory control
Cape Peninsula University of Technology	2004	Annually
Central University of Technology	Information not available	
Durban Institute of Technology	2004	Annually
Nelson Mandela Metropolitan University	Information not available	
North-West University		
• Mafikeng Campus	2003	Irregular
• Potchefstroom Campus	Not done	-
Rhodes University	2004	Every five years
University of Stellenbosch		
• Stellenbosch campus	1980s	Irregular
• Saldanha Campus	2004	Annually
Tshwane University of Technology	2004	Annually
University of Cape Town	2004	Annually
University of Fort Hare	Not done	-
University of the Free State	1998	Irregular
University of Johannesburg	Not done	-
University of KwaZulu-Natal	2002	Irregular
University of Limpopo	2004	Irregular
University of Pretoria	2004	Irregular
University of South Africa	2004	Annually
University of Venda for Science and Technology	2003	Irregular
University of the Western Cape	2004	Annually
University of the Witwatersrand	2004	Annually
University of Zululand	Not done	-
Vaal University of Technology	2004	Annually

Walter Sisulu University for Technology and Science	Information not available	
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Source: Telephonic survey conducted during April 2005.

3.3.2 Loss of information resources

Reasons why information resources are considered as lost include the following:

- theft,
- mutilation,
- patrons' non-return of library items,
- incorrect spine labels,
- incorrect input on the computer catalogue,
- library staff using library items but not issuing them,
- misplacement of information resources, including regular library clients hiding books on shelves for reuse the next day, without issuing them, and
- damage through repeated use and sometimes inappropriate handling by clients.

The word "**loss**" refers to the situation where an information resource is inaccessible in its totality for use by other clients, or when an academic librarian cannot find a specific information resource over a period of time.

Bullard (2001:213) contends that most criminal activity in academic libraries takes the form of theft or damage of library items. Damage occurs for different reasons, for example when library clients "willfully or maliciously or wantonly write upon, cut, tear, deface, disfigure, soil, obliterate, break or destroy" any information resource (University of North Carolina 2003:1).

Loss, especially through theft, is not a new phenomenon in the library profession, because it can be traced back to ancient Egypt (Munn 1935:589). According to legend, the ancient Egyptian King Ptolemy II withheld wheat from the starving inhabitants of Athens during a

famine until he could borrow and copy Greek literary and philosophical manuscripts. He kept the originals in the great Alexandria Library and sent the copies to Athens. Aristotle, the philosopher, condemned the theft of books for profit, but was less harsh when the book was stolen for personal reading pleasure (Brooks 2001:1). In medieval libraries books were chained to book stands to prevent theft. Written warnings were issued, for example:

“He who steals this book/ may he die the death/ may he be frizzled in a pan...Let him be struck with palsy/ and all his members blasted/ Let him languish in pain crying aloud for mercy, and let there be no surcease to his agony till he sing in dissolution/ Let bookworms gnaw his entrails in token of the Worm that dieth not/ and when at last he goeth to his final punishment, let the flames of hell consume him forever” (Brooks 2001:1).

Today loss, especially of rare books, manuscripts and maps, is still a serious issue in academic libraries all over the world (Van Nort 1994:26). For example:

- In 1988 Mr R Redmond, a student of the University of North Carolina/ Greensboro, was arraigned on a charge of stealing 700 library books valued at \$23 000.
- In 1989 Mr GJ Hasford, a screenwriter, was apprehended on account of the disappearance of 2 000 books from 77 libraries, including college and university libraries.
- Mr Matovsky, a history student at Texas A & M University, was found guilty on charges of stealing nearly 600 books from universities in Texas, Florida and Louisiana in 1990.
- In 1995 the theft of ancient manuscripts from the Russian National Library was attributed to a Mr D Yakubovsky.
- Also in 1995, 56 original manuscripts and 31 books were found missing in the National Archives Department of Jelenia Gora in Poland.
- The following appeared in May 1996: “Some 8 000 books, many signed by their century British authors, were donated to Chicago by the British after the Great Chicago

Fire, 1871. All but 343 are missing" (Association of College and Research Libraries 1996:1).

- "Mr Peter Bellwood from Colchester, Essex, used a razor to remove 50 pages from rare atlases in Aberystwyth from March 2000 to August 2000, and sold them to collectors for £70,000" (British Broadcasting Corporation News 2004:1). He was arrested in July 2004 and convicted in Swansea Crown Court after admitting to six charges of theft from the National Library of Wales. The same article refers to a book written by an academic, David Bannister, which lists the top sixty collections in British libraries. This book is known as the "thieves' handbook", and Mr Bellwood also used this book to choose which rare prints to steal. Later he sold some of the stolen prints to Mr Bannister.
- One of the more extreme examples of recent reported library thefts is the case of Mr Stephan Carrie Blumberg who was convicted in July 2003 in Iowa on charges of stealing 28,000 books and documents from 154 college libraries (Association of College and Research Libraries 2003:1).

Very little has been published about loss determination and deterrence by means of inventory control in South African academic libraries. In one instance a case study was published on inventory-control project launched in the academic library of a previous traditional university, the University of Durban-Westville. This academic library conducted a stocktake of its information resources in 1986 after an interval of just over 10 years since the previous occasion. Their losses sustained totalled 24 365 information resources (Jayaram 1987:52). One of the main reasons why the library management decided to undertake inventory control was the security risk attending the construction work that was in progress on the library building at the time.

3.3.3 Loss rate

In a study done in British libraries the annual loss rates for public and academic institutions were 4.2% and 1.8% to 2.2% for specialised libraries (Burrows & Cooper 1992:11). The Stony Brooke University Libraries (2003:1) set the annual loss for academic libraries at 5 to 10%. Although it is common to present library loss as a percentage of a particular collection, a percentage does not necessarily convey a real sense of the physical dimensions and proportionalities concerned. With a view to aiding concretisation,

therefore, consider that:

- An annual loss of 4.2% amounts to 1680 items of a collection total of 40,000.
- A 1.8% loss amounts to 1800 items out of a collection total of 100,000.
- An 0.1% loss amounts to 15,000 items out of a collection total of 1.5 million items.

The Indian Library Association formulated “permissible limits of library loss” in 1970:

“Barring cases of proved negligence and dereliction of duty on the part of the individual, the loss of up to four for every thousand items issued out and consulted within the library should be considered reasonable and the question of penalizing anybody for the loss of this extent should not arise” (Indian Library Association 1970:198).

Electronic security systems became popular as a theft prevention measure, although it was, and still is, an expensive system to purchase and install (Greenwood & McKean 1985:275). Loss of information resources is inevitable in academic libraries but of course all possible steps must be taken to minimise the phenomenon. The literature study of the loss rate of information resources in academic libraries shows that the acceptable percentage of loss is usually determined for itself by each academic library.

3.3.4 Risk factors attending safekeeping of information resources

The *Report to the Nation on occupational fraud and abuse* compiled by the Association of Certified Fraud Examiners (ACFE) (1996:1) contained the assertion that the average United States institution loses up to 6% of its gross revenue due to fraud and abuse (Chadwick 1998:15), and that white-collar crime in the United States increases at an annual rate of 15%.

Bullard (2001:213) writes as follows about this global phenomenon: "Most criminal activity in libraries involves the theft of or damage to collections." Damage refers to mutilation, soiling, tearing, disfigurement of a page, breaking of the back of the book and when clients are writing on a page. New books and periodical articles are particularly prone to those kind of abuse.

Especially rare books, manuscripts and maps are very vulnerable due to:

- a substantive increase in the market value of these items,
- easy access to areas where these items are kept,
- inadequate security measures to discourage fraud and abuse by staff and clients (Chadwick 1998:16).

An academic library is responsible for the safekeeping of information resources. Lincoln and Lincoln (1986:12-17) note that the following risk factors must be evaluated with a view to securing these academic library assets:

(1) The ease of academic library access and lack of security

Lincoln and Lincoln (1986:12) write: "Many of the problems of theft and most of the problems caused by problem patrons are exacerbated by the ease of access."

(2) The desirability of the information resource

Information resources, especially those ordered from overseas, are expensive and can become high-risk items.

(3) Crime prevention training

The lack of crime prevention training for library staff is another risk factor mentioned by Lincoln and Lincoln (1986:13).

(4) Academic library hours and reduced library staff

Unscrupulous library clients may take advantage of operating hours late at night or over weekends and other times when the library might have a skeleton staff available to provide services.

(5) The design of the academic library

Another possible risk factor is the design of the building, which may inhibit or enhance criminal behaviour. Open stack collections can make it very difficult for library and security staff to keep an eye on all library clients at all times. DeRosa (1981:31) states in this regard: "High book stacks, alcoves, small reading rooms, and other difficult to observe areas in most libraries provide the sex offender, robber, and other criminal types with the seclusion they need to prey on their victims. In many large library buildings, even the employment of a small army of security personnel could not effectively survey all these areas."

(6) Academic library staff activities

The work load of library staff may facilitate criminal acts because some areas of the academic library are perforce not supervised while they are busy with clients and/or a specific library activity. Moreover, client volume during peak times makes supervision nearly impossible.

(7) Legislation and academic library policy

Legislation, and especially library policy, play an important role in the discouraging criminal behaviour in the library.

Security must be a major concern of the entire academic library, not only that of the library security staff. The academic library management should develop written policy on security, including a standard operating procedure for dealing with theft, mutilation of assets and other security problems.

Security measures can assume a variety of forms. For example:

- A system under which all keys to high-security areas are issued, signed for and returned daily to security where they are stored in an adequately locked container.
- A well-developed programme of personal access to the academic library.
- A security system that comprises the recording of entries and departures of visitors in a security register.
- Limiting and controlling access to secured areas containing materials of high quality (eg. archival material).
- Formal instruction that all information resources removed from the library to be properly issued by authorised academic library staff.
- Using closed-circuit television (CCTV) in strategic places in the academic library, including at all entry and exit points to the academic library.

The more risk factors an academic library identifies in its organisational setup, the more prominent the profile that should be lent to security. Library staff who take the security of library assets seriously are probably the best guarantee against theft by clients and staff.

The results of inventory control can be used to detect rising numbers of missing items and to identify vulnerable items.

3.3.5 The role of inventory control in internal auditing

Internal auditing is defined by the Institute of Internal Auditors (2001:1) as follows:

“Internal auditing is an independent, objective assurance and consulting activity designed to add value to and improve an organisation’s operations. It helps an organisation to accomplish its objectives by bringing a systematic, disciplined approach to evaluate and improve the effectiveness of risk management, control and governance processes”.

The main target areas of internal auditing are:

- the operational management of an organisation, which includes the organisation’s goals, policies, decisions, standards and control measures, and
- the administrative and financial aspects of the organisation, which include the record-keeping and control systems of the organisation.

The main goals of internal auditing are:

- to examine and evaluate at least the most important activities of an organisation in order to assist the management of that particular organisation to perform cost-effectively and efficiently,
- to provide constructive problem-solving suggestions that include proactive measures to reduce management risks, and
- to detect errors and dishonesty.

The object of internal audit in an academic library is to determine whether there are adequate internal control measures in the academic library including inventory control. The internal auditor must therefore endeavour to understand the academic library procedures and policies to see whether they are adequate. “Internal audit also verifies the existence of university assets and ensures that proper safeguards are maintained to protect them from loss” (Chadwick 1998:16-17).

3.4 INVENTORY CONTROL AND DATA COLLECTION METHODS

Gupta (1990:101) describes ten methods of verifying information resources: verification by shelf-list card, shelf-list card with extra columns, duplicate set of charging cards (book cards), charging cards (book cards), master record, accession register, separate register containing accession numbers, separate sheets containing accession numbers, numerical counting, measuring linear feet of material on shelves, sample stock verification, continuous stock verification and verification by computer.

This study deals with manual and automatic inventory control.

3.4.1 Manual inventory-control methods

“Inventory” in an academic library usually indicates one of two main manual actions:

- comparison of a printed and/or electronic list of the contents of a specific shelf with the actual status of the shelf, known as an in-stack inventory, and
- a physical count of books on the shelf, known as out-of-stack inventory (Haka & Stevens 1985:2).

The two actions can be part of a total manual inventory of every single information resource in the academic library or in a specific collection, but sampling is preferable especially in large academic libraries.

Statistical sampling is appropriate whenever generalisation is required about a specific collection from which the sample was drawn on the basis of the sample results.

In sampling, capital letters refer to attributes of the population, whilst lowercase letters have to do with the sample. The population N comprises a specific number of units denoted by x_1, x_2, \dots, x_N . The population total N has the following statistical definition:

$$\sum_{i=1}^N x_i = x_1 + x_2 + \dots + x_N$$

The statistical definition of the sample total is as follows:

$$\sum_{i=1}^n x_i = x_1 + x_2 + \dots + x_n$$

There are a variety of existing statistical sampling techniques to choose from and four different options were identified as possible options in step five:

(1) Computer random sampling

Computer random sampling refers to a random selection of a group of information resources from a collection according to Dewey Decimal Classification System (DDCS) numbers. The work group is responsible to provide the initiator call number as x_1 from the population as

$$\sum_{i=1}^n x_i = x_1 + x_2 + \dots + x_n$$

(2) Systematic sampling

Simple random sampling in academic library inventory-control exercises is a method of selecting n units (ie. the specific number of items in the sample) out of N (ie. the population) such that every item has an equal chance of being drawn.

In other words, a sample (n) is secured by selecting every k th information resource from a collection (N = total population), starting with a randomly selected information resource between 1 and k as x_1 from the population as

$$\sum_{i=1}^n x_i = x_1 + x_2 + \dots + x_n$$

For example, suppose the collection consists of 10 000 information resources, and a sample of 200 of these items will be drawn through systematic sampling. The sampling interval is 50 ($N \div n = 10\,000 \div 200 = 50$). A random number must then be selected between 1 and 50 (eg. 23). Every k th item must be drawn thereafter, namely: {23; 73; 123; 173, k_n }.

(3) Cluster sampling

A cluster sample consists of either an unrestricted random sample or a stratified random sample in which groups of contiguous sampling units are drawn (Arkin 1984:47). The sample is obtained by using either random number or systematic sampling techniques.

(4) Stratified random sampling

Stratified random sampling consists of dividing the population of N into segments, also called subpopulations or strata, of N_1, N_2, \dots, N_N . "These subpopulations are non-overlapping, and together they comprise the whole of the population" (Cochran 1977:89). In other words $N_1 + N_2 + \dots + N_N = N$. Simple random sampling or systematic sampling is then taken within each stratum with the end result of a stratified random sample.

Inventory control, using the sampling technique, only includes part of the collection. The sampled information resources are printed and then checked against the contents of the particular shelves.

3.4.2 Automated inventory-control methods

In the light of the ever-increasing amount of information available, as well as the rapid changes in technological innovation, studies in the late 1980s, explored the automated method of stocktaking. This method consisted of information resource barcode scanning with a hand-held reader and comparing this list of results with data available on a library's computerised management system (Allatt, Fisher & Yeadon 1997:161). Miller (2000:4) writes that "many libraries are just beginning to consider the application of barcode systems to collection inventories."

Today the use of radio frequency identification (RFID) brought a revolution to information resources' tracking in the academic library world.

“Radio frequency identification (RFID) is a method of remotely storing and retrieving data using devices called RFID tags/transponders. A RFID tag is a small object, such as an adhesive sticker, that can be attached to or incorporated into a product. RFID tags contain antennas to enable them to receive and respond to radio-frequency queries from a RFID transceiver” (Wikipedia 2005:1).

RFID tags can replace or continue to work alongside current optical barcode systems. Its cost and time saving implications for the inventory-control function is unprecedented.

3.5 AN INVENTORY-CONTROL PROJECT

Inventory control is usually a project handled by the academic library staff. Such a project is treated as a hard systems approach to change management based on the following assumptions:

- The problem can be easily described.
- There is a clearly identifiable solution to the problem.
- The problem can be disentangled from the context to be solved.
- The problem and the solution are predictable.
- Staff members of the organisation purportedly have the appropriate expertise to solve the problem.
- Interpersonal sensitivity is not required (Ackoff 1993:51-53).

In other words, missing information resources were a very clearly described problem that required an identifiable bottomline solution to achieve a well-articulated and understood future state.

To plan and implement an inventory control project, the logic steps of Systems Intervention Strategy (SIS), as a hard systems approach, are followed naturally in many academic libraries without being explicitly aware of it.

3.5.1 The Systems Intervention Strategy (SIS)

SIS has its origins in systems engineering methods, also known as hard approaches. It was also influenced by the soft approaches of management theories and social psychology.

The **Systems Intervention Strategy (SIS)** is a hard systems approach to change management, which is particularly appropriate to a bounded change situation.

SIS integrates other problem-solving approaches, such as project management, by embedding them in a three-phase process described, namely:

(1) the diagnosis or description phase

“The process by which you get to grips with the particular set of change problems, develop a perspective on them and in which the purposes of the change are spelt out” (Butterfield 2000:36).

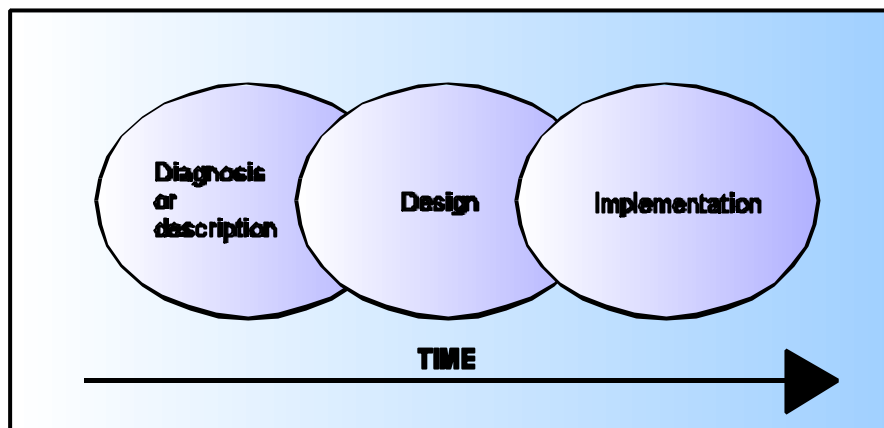
(2) the design phase

“Design is the phase in which alternative methods or “options” for achieving change are suggested and explored” (Butterfield 2000:36).

(3) the implementation phase (see figure 3.1)

“Implementation... is the process of developing a means for bringing the desired change about and then seeing it through” (Butterfield 2000:36).

FIGURE 3.1
THE THREE PHASES OF THE SYSTEMS INTERVENTION STRATEGY



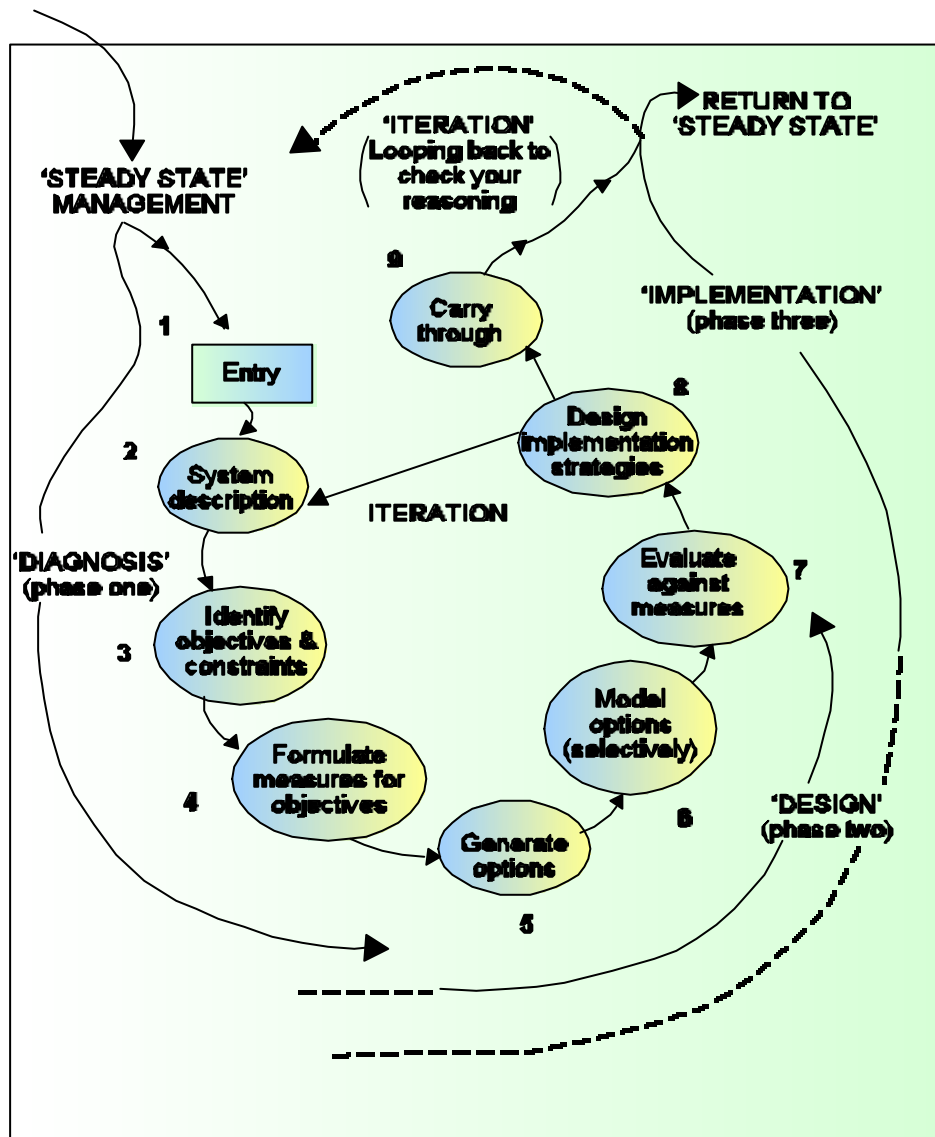
Source: Mabey (1997:9).

These phases all conform to the basic principles of meaningful participation (team work) and systematic thinking, which is guided by the nine steps within the three SIS phases (see figure 3.2), namely:

- Entry (a specific problem is identified).
- Systems description (the scope of the problem is described).
- Identify objectives and constraints.
- Formulate measures for objectives.
- Generate options.
- Model options.
- Evaluate options against measures.
- Design implementation strategies.
- Carry through.

In practice these nine steps usually do not follow each other in a straight linear progression, but are characterised by a cyclical and iterative process.

FIGURE 3.2
THE NINE STEPS WITH THE THREE
SYSTEMS INTERVENTION STRATEGY PHASES



Source: Butterfield (2000:37); Mabey (1997:10).

3.6 SUMMARY

The higher-education environment in South Africa was described with particular reference to the situation of the academic library in South Africa after 1994. Current actions aimed at transformation were explored, such as the merging of higher-education institutions in 2004, and global phenomena impacting the South African academic library (eg. rapid developments in information technology).

Inventory control in academic libraries was discussed against the background in its past and present context. The logical steps of SIS as a hard systems approach, were explained as a management tool to plan an inventory-control project.

CHAPTER 4

A CASE STUDY: THE LIBRARY OF THE UNIVERSITY OF SOUTH AFRICA

4.1 INTRODUCTION

In this chapter a case study of inventory control in a South African academic library is described and the factors leading to the implementation of inventory control in the academic library are investigated. The planning of this academic library's first inventory-control project is explained by using a hard systems approach, namely SIS.

The latter part of chapter 4 covers the inventory controller's job profile, as well as the inventory-control process in the academic library.

The University of South Africa's academic library has been chosen as the site of a case study because it is one of the South African academic libraries with an inventory-control history stretching back to 1992.

4.2 THE UNIVERSITY OF SOUTH AFRICA

The University of South Africa, further referred to as Unisa, celebrated its 130th anniversary in 2003 which makes it the oldest university in South Africa. As a distance education university its students are scattered all over the world while its main campus is situated in Pretoria, South Africa.

As already mentioned in paragraph 3.2.3, Unisa merged with Technikon South Africa and the distance education section of Vista University, called Vudec, in 2004. The new Unisa has just over 200,000 students and re-organised itself in 2004 into five Colleges and a Graduate School of Business Leadership (SBL). The five Colleges are:

- College of Economic and Management Sciences,

- College of Human Sciences,
- College of Law,
- College of Science, Engineering and Technology, and
- College of Agriculture, Natural Resources and Environmental Sciences.

4.2.1 The Unisa Library

The Unisa Library provides all library and information services required to support the above-mentioned academic structures. In 1946 the first book of the Unisa Library was accessioned and in 1996 the Unisa Library celebrated 50 years of service. The Unisa Library employs 272 staff members and houses a stock of just over 2.07 million items. The collections are found in open-stack arrangement on the main campus in Pretoria and in branch libraries, as well as in some public libraries, around the country. Excluding the latter, all these collections are subjected to inventory control.

Currently (early stages of 2005) the Unisa Library consists of four divisions:

- the Library Management Services Division,
- the Client Services Division,
- the Document Delivery Division, and
- the Technical Services Division.

The Unisa Library is nearing the end of a reengineering process that will result in a changed organisational structure in 2006.

4.2.2 Risk factors in the Unisa Library

Access to the Unisa Library is controlled with security staff at access points, as well as an electronic security system. If the risk factors identified by Lincoln and Lincoln (1986:12-17) and articulated in paragraph 3.3.4 are considered in the context of the Unisa Library it

seems logical to conclude that rather than easy access, the real problem lies with the desirability (ie. temptation to gain illegal possession) of certain information resources. For example, textbooks become high-risk items when they are prescribed, and some stolen Unisa Library books even find their way to informal booksellers on the street. It is very difficult to control this phenomenon.

Unisa Library's open stacks spread out over eight levels and sparsely distributed visitors during operating hours after 16:00 and over weekends provides a good opportunity for certain criminal acts, such as removing a tattle-tape strip from a book, because clients are largely hidden from the sight of library and security staff among the open-stack collections. On the other hand the high volume of visitors during peak hours presents a similar surveillance problem. Unisa Library's risk exposure is heightened by the lack of training in security techniques of all its library staff.

Unisa follows strict policies to discourage illegal removal of information resources, such as suspension of enrolment if an apprehended perpetrator is a Unisa student.

4.3. INVENTORY CONTROL AS A SOLUTION

By 1992 the number of items that were suspected of falling prey to illegal removal from the research and reference stock of the library had grown to alarming proportions. The reasons for awareness of the problem were:

- The increase over years in complaints received from Unisa Library clients and staff that they found it difficult to retrieve information resources in the Unisa Library.
- The increase in the number of missing items indicated on the library computer system catalogue referred to as OASIS.

The situation caused grave concern because of its negative implications for the record of service excellence that the library was trying to establish and maintain. The Library Management Committee (LMC) and Unisa's internal auditors therefore ordered an inquiry to determine the dimensions of the problem.

Surveys were conducted until 1998 when the annual stock survey revealed disturbing trends regarding probable stock losses in the audiovisual section, particularly in the

compact disc collection. A complete inventory was therefore taken of this specific collection in 1999. In the same year an increase in missing items was revealed in the research collection. The Unisa Department of Internal Audit then called for a full inventory control of the reference collection and part of the research collections, which was approved by the management committee of the Unisa Library.

A complete stock-take of the research collection, reference collection, study collection (prescribed and recommended books), and the science library was scheduled for March 2002 to February 2004.

Full inventory control of all library collections at Pretoria and beyond was subsumed under the 2003 and subsequent inventory-control actions. Moreover inventory-control checks had to be preceded by shelf reading to ensure shelf order so that items would be “findable”.

Shelf reading is the task to check whether an information resource is in its proper position on the shelves according to its call number. Cooper and Wolthausen (1977:43) states: “If books are out of order on the shelves of the library, the likelihood that a user will find a desired book is reduced.” Shelf reading and **shelving** (ie. positioning an item back on the shelf in its correct place on the shelf after it was used by a client) are serious concerns, because a misshelved item is a lost item (Owens 1992:14).

However, the services of additional student workers, as well as additional supervision, were required for this exercise. Inventory-control tasks (verifying the physical presence of library information resources against control lists derived from the library catalogue/acquisitions register) are performed by teams of student workers, usually 14 students for stocktaking (12 months) and 12 students for four months to perform ancillary stocktaking activities such as restoring/maintaining shelf order.

Training of each new group of students is essential in order to service the required turnover of student workers and muster the knowledge required to perform stocktaking. The new student workers periodically introduced into the Unisa Library also requires careful supervision, as well as excellent planning and organisation of their work schedules.

A summary of the inventory-control activities, as well as the number of staff involved over the years, are shown in table 4.1.

TABLE 4.1
HISTORY OF INVENTORY CONTROL IN THE UNISA LIBRARY

Year	Permanent staff complement	Contract staff complement	Number of inventory control items involved
1992	1	1 student x 1 month	1 118 items (sampling)
1993	1	1 student x 1 month	1 369 items (sampling)
1994	2	2 students x 1½ months	3 516 items (sampling)
1995	2	3 students x 1½ months	5 225 items (sampling)
1996	2	4 students x 2 months	9 019 items (sampling)
1997	2	4 students x 2 months	9 019 items (sampling)
1998	2	4 students x 2 months	9 019 items (sampling)
1999	2	4 students x 2 months 12 students x 4 months	9 019 items (sampling) ± 200 000 items (stocktaking)
2000	2	12 students x 8 months 2 students x 4 months 3 casual library employees	± 1.1 million items (stocktaking)
2001	2	12 students x 8 months 2 students x 4 months 2 team coordinators 3 casual library employees	± 1.4 million items (stocktaking)
2002	2	12 students x 12 months 2 team coordinators 3 casual library employees 12 students x 4 months	± 1.9 million items (stocktaking) Shelf reading ± 1.5 million items

2003	2	12 students x 12 months 2 team coordinators 3 casual library employees 12 students x 4 months	± 1.9 million items (stocktaking) Shelf reading: ± 1.5 million items
2004	2	14 students x 12 months 2 team coordinators 3 casual library staff 12 students x 6 months	± 2 million items (stocktaking) Shelf reading: ± 1.6 million items
2005	5	14 students x 12 months 2 team coordinators, 1 database operator 12 students x 4 months	± 2 million items (stocktaking) Shelf reading: ± 1.8 million items

Randall (1972:130) warned that inventory control must only be considered after “careful planning in which the library staff participates and after the users have been advised of the necessity of the activity and the procedures to be followed”. The initiation of the inventory-control project in the Unisa Library did not follow this route for the following reasons:

- Involvement with inventory control was confined to the Library Management Research Section of the Unisa Library. Additional staff requirements are met by employing student workers who receive in-service training. These student workers can keep their positions for twelve months.
- Inventory control did not involve the physical closing of the library and/or the interruption of services to clients.

Inventory control is usually a complex and a time-consuming task in academic libraries (Gupta 1990:16), and the Unisa Library was no exception for the following reasons:

- Physical control and checking of inventory lists against the information resources on the shelves is difficult, because the inventory is conducted in different locations.
- The diversity of the items in the inventory presents difficulties. The inventory in the Unisa Library includes books, periodicals, microfiche, videos, and compact data

discs.

- Inventory control is done while the organisation is operational. A book can be borrowed, returned, renewed or removed from its location for other purposes (eg. browsing by library clients) at any time.

- The valuation of inventory is also difficult due to the size of the library's collections (more than 2 million items).
- Call number or location mistakes can cause havoc during inventory control.
- Non-availability of permanent staff members to take on the extra workload was a major issue during the initial phase of the inventory-control project.
- Browsing clients may move library resources from one shelf to another or items may be moved for operational reasons, for example when a damaged book is sent to the bindery.
- Cataloguing discrepancies and other technical errors are major obstacles in locating certain items.
- Automated stocktaking is still not possible because the number of digits per barcode are not standardised. Items in the Unisa Library have 10-digit and 6-digit barcodes, while a significant number of information resources still need to be fitted with barcodes.

Positive comments on the retrieval of items were received as the inventory-control project of the Unisa Library collections progressed. At the same time a whole new series of unexpected challenges and unintentional positive outcomes emerged which will be dealt with in chapter 5.

The planning and implementation of the inventory-control function in the Unisa Library proceeded according to a hard systems approach.

4.3.1 Inventory control according to SIS

The steps in the first inventory-control project conducted by the Unisa Library were described according to a SIS approach.

Step 1: Entry

The LMC of the Unisa Library decided to conduct yearly missing-items surveys based on statistical principles so that an indication could be gained of the probable extent of losses and trends from year to year. It was seen as a problem-solving situation.

Step 2: Description

The problem of determining the possible number of lost information resources was seen as a bounded problem:

- Know what the problem is (ie. suspected loss of information resources).
- Know the solution (a survey).
- Know what needs to be known. For example, statistical knowledge of library staff was enough to conduct a survey.
- The problem and its solution can be treated as separate from other library matters.
- A limited number of staff will be involved, namely:
 - the head of the Library Management Research Section,
 - one representative of the Department of Internal Audit,
 - one information-science expert from the Department of Computer Services,
 - one statistician from the Department of Statistics, and
 - one temporary student worker.
- The priorities were clear, namely to develop an appropriate survey to establish the loss rate, conduct the survey and give feedback to the LMC.
- Limited implications were foreseen for the survey.
- The LMC gave a deadline for feedback about the survey's results.

Step 3: Identify objectives and constraints (see table 4.2)

Step 4: Formulate measures for objectives (see table 4.2)

TABLE 4.2
MEASURES FOR OBJECTIVES

Objective (Step 3)	Measure as end product (Step 4)
Determine the possible number of items not found in both the research and the reference collection.	<ul style="list-style-type: none"> • Calculated sample proportion. • Calculated 95% confidence level. • Calculated significant difference between two consecutive years.
Determine trends in the proportion of items lost per year in the reference and research collections respectively.	<ul style="list-style-type: none"> • Compared results of different years. • Linear regression applied after three years to determine more accurate proportional data.
Ensure acceptable scientific results for decision making.	<ul style="list-style-type: none"> • Appropriate statistical formulas.
Keep the cost of conducting the survey as low as possible.	<ul style="list-style-type: none"> • Cost analysis.
Determine vulnerable subject areas.	<ul style="list-style-type: none"> • Calculated proportion of missing items in each subject.

Constraints identified were:

- No Unisa staff member is responsible for stocktaking and one library staff member and one student worker were identified to conduct the survey over a period of one month.
- The size of the reference and research collections, and the fact that only two people will be responsible, will result in a small sample that may compromise the statistical outcome of the survey.

Step 5: Generate options

The decision by the LMC to conduct surveys was specifically taken because of the size of the reference and research collections.

There are a number of existing statistical sampling techniques to choose from and in step five four different options were identified:

- computer random sampling,
- systematic sampling,
- cluster sampling, and
- stratified random sampling.

Step 6: Model options

The proposed options must be tested by modelling them, but this was not necessary for step 6, because the above-mentioned four sampling techniques are tested, proven and acceptable statistical procedures.

Step 7: Evaluate against measures (see table 4.3)

TABLE 4.3
EVALUATION OF STATISTICAL OPTIONS

Statistical option	Major disadvantages
Computer random samples	<ul style="list-style-type: none"> • Some small subject fields may be excluded from the sample.
Systematic sampling	<ul style="list-style-type: none"> • Some small subject fields may be excluded from the sample.
Cluster sampling	<ul style="list-style-type: none"> • A larger sample size is required at increased costs and manpower, to prevent a loss of sample precision and reliability. • Certain subject fields will be excluded from the sample.
Stratified random sampling	<ul style="list-style-type: none"> • Cost and time requirement are increased because a sample must be taken from each of the strata.

Random sampling was considered the most suitable of the techniques that could be used to meet the requirements in this instance. There were two main reasons for this choice:

- The larger collections of the Unisa Library, arranged according to the DDCS are heterogeneous while the subpopulations are relatively homogeneous. Stratified random sampling enables the inventory controller to include samples from all subject fields and to take into account that some subpopulations (eg. items on the latest software programs) could be more prone than others to being absent from shelves owing to theft or legitimate use.
- The stratified random sampling method, based on demonstrable statistical principles, will provide defensible and objective (ie. unbiased) results.

Step 8: Design implementation strategies

The following steps were set as prerequisites for the survey:

- Determine total population of both collections.
- Calculate sample sizes.

- Apply the chosen sampling technique, excluding all items with a status of “not on shelf” (eg. items borrowed by patrons or sent to the bindery).
- Print the data for each chosen information resource on a card (see figure 4.1).

FIGURE 4.1
A PRINTED CARD BEARING PARTICULARS OF
AN INFORMATION RESOURCE'S DATA

CALL NO:	190.943 LEI
Schiedermaier, Hartmut	
Das Phänomen der Macht und die Idee des Rechts	
ITEM ID:	0000284221
STATUS: SH	

SH = on shelf

Source: Unisa Library. 1992. Research Collection cards. (Work document).

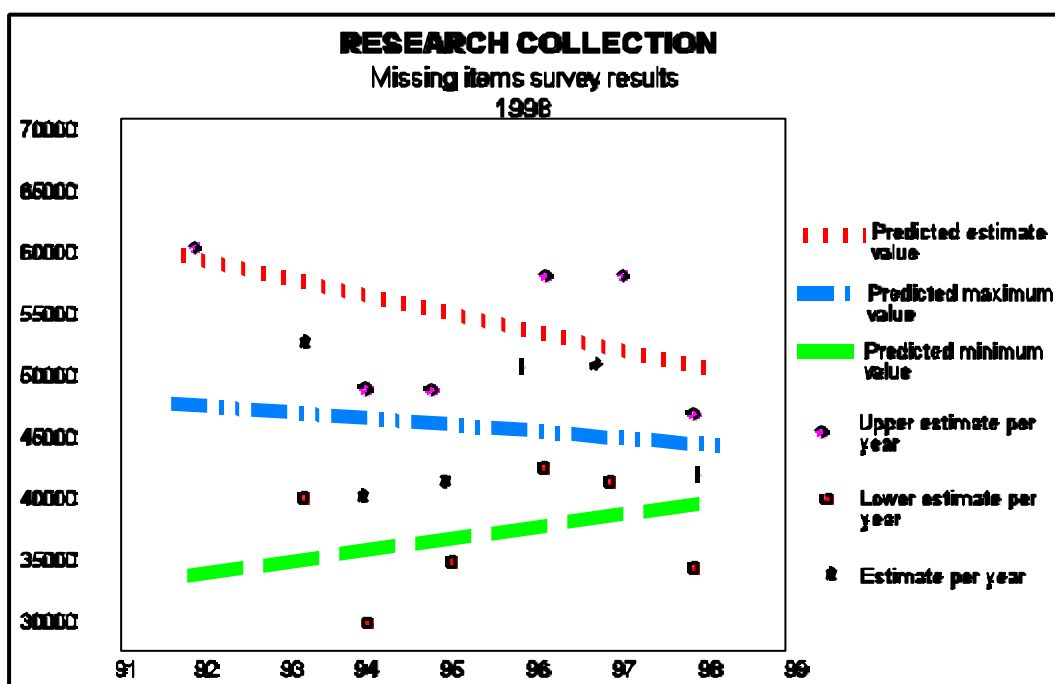
The next step was the actual survey. The cards were taken to the shelves and checked against the information resources indicated on the cards. Missing items were checked against the computer catalogue to ensure that the items had not been issued since the cards were printed. After checking all cards the proportion of missing items was calculated, as a point estimation (ie. a single value serving as an estimate of the unknown population parameter of missing items). A confidence interval for the percentage of missing items with a specific level of certainty or confidence (usually a level of certainty of 95%) was then calculated. The confidence interval is a prediction that the unknown population parameter will lie within this interval with a 95% certainty. For example, there is a 95% chance that the actual number of missing items is between 1 025 and 1 805.

Step 9: Carry through

Intervention took place and feedback was given to the management of the Unisa Library. The end product of the yearly inventory-control survey was compiled into a report for the Unisa auditors and the LMC.

The aim of the survey was to investigate whether the proportion of missing information resources in the Unisa Library and its branches was increasing every year. After 4 yearly surveys the Unisa Library applied linear regression (a statistical technique to fit a straight line to a set of data points) to obtain a more precise estimate of missing population total (cf. figure 4.2 showing a linear regression of the Unisa Library research collection survey results from 1992 to 1998).

FIGURE 4.2
UNISA LIBRARY RESEARCH COLLECTION SURVEY RESULTS
OF 1992 TO 1998



S

ource: Unisa (1998:1).

4.3.2 Inventory-control methods

Five main methods as used in the Unisa Library have been identified for this study, namely:

- manual shelf-list verification,
- verification by portable barcode scanner,
- sample verification,
- measuring linear metre of material on shelves, and
- archival inventory-list verification.

The first of the above mentioned methods (also called an in-stack inventory as noted by Haka & Stevens 1985:2) consists in physically checking the shelf list (previously the catalogue cards) generated from the existing electronic catalogue in print form against the particular inventoried information resources. The second method consists using one of the more current technological aids available for inventory. In this case there is no need for a printed shelf list, because the information resources can be checked with a portable barcode scanner (Webb 1994:21).

Sample verification was used mainly during the first few years when inventory control started. This method was discussed at length in paragraph 3.4.1. The last two of the verification methods listed above are both applied in the Unisa Archives and Special Collections Section. Manuscripts are measured in linear metres, and for internal auditing purposes this is one of the acceptable verification methods. Unfortunately it does not give a precise feedback on the actual items on the shelf. In 2004 the Unisa Library started to verify manuscripts of value, eg. a letter written by Desmond Tutu. These items were identified by the Unisa archival staff and indicated as a valued item on the different archival inventory-lists to be checked by the inventory-control staff. The advantages and disadvantages of each of these methods are listed in table 4.4.

TABLE 4.4
MAIN ADVANTAGES AND DISADVANTAGES OF
INVENTORY-CONTROL METHODS USED IN THE UNISA LIBRARY

Method	Main advantage	Main disadvantage
Total manual shelf-list verification	<ul style="list-style-type: none"> • Reasons for items not found, can be verified and corrected. • Items not on catalogue can be rectified. • All items in need of maintenance or withdrawal can be identified. 	<ul style="list-style-type: none"> • Very time consuming • Expensive function. • Sufficient staff needed to take responsibility for this function. • Training of student workers takes time. • Not all student workers are very accurate.
Portable barcode scanner verification	<ul style="list-style-type: none"> • Less time consuming than a total manual shelf-list verification. • Less staff necessary to accomplish this task. • Shelf-reading done simultaneously. 	<ul style="list-style-type: none"> • This method cannot be used because barcode lengths of items are not uniform. • Enough barcode scanners must be available. • Barcode scanners cannot be used on a 24-hour basis.
Sample verification	<ul style="list-style-type: none"> • Less time consuming than a total manual shelf-list verification. • More cost effective than a total manual shelf list verification. • Results are very reliable if the procedure is scientifically correct. 	<ul style="list-style-type: none"> • Reasons for items not found cannot be verified and corrected. • Items not on catalogue rarely identified. • Items in need of maintenance or withdrawal can rarely be identified.
Measuring linear metres of material on shelves	<ul style="list-style-type: none"> • Quick to measure. • Less staff necessary to do the measuring. 	<ul style="list-style-type: none"> • Results do not verify archival items.
Archival inventory-list verification	<ul style="list-style-type: none"> • Very time consuming. • Need enough staff to do the verification. 	<ul style="list-style-type: none"> • Student workers not always the best people to do this verification due to the specialist knowledge required.

4.3.3 Requirements set for inventory controllers on the library staff

Unisa Library staff members whose key performance areas are specifically focused on the verification of information resources are called inventory controllers. They have to satisfy the following work-related criteria (Unisa 2004:3-4):

Qualifications

- 3-year degree from an university or technikon.

Courses

- Relevant courses in inventory control (usually presented by experienced Unisa Library staff).

Knowledge

The information-resources inventory controller must demonstrate the following:

- Advanced knowledge and understanding of the principles of describing information resources, (eg. by interpreting the classification system and navigating shelves according to describing rules).
- Advanced knowledge and understanding of in-house system (eg. by applying and interpreting basic functionality of the searching module of OASIS).
- Knowledge and understanding of process design.
- Knowledge and understanding of process performance management.
- Knowledge of existing and new library processes.

Experience

- 2 years' experience in an information resources inventory-control environment.
- 2 years' supervisory experience in a library environment.

Skills, abilities and attitudes

The inventory controller must be able to demonstrate the following competencies:

- Numerical fluency (ie. handles calculations, reconciliations and comparison with ease, speed and precision).
- Advanced organising skills (ie. able to create a logical workflow plan and speed up delivery).
- Information scanning (ie. can distil essential, relevant statistics from acquired information).
- Enablement (ie. can guide others to correctly find, interpret and apply knowledge and work independently).
- Sense of urgency (ie. takes effective ownership of deadlines and priorities).
- Results orientated (ie. achieves efficient delivery outputs with measurable results).

4.3.4 The duties of an inventory controller in the Unisa Library

Inventory controllers are responsible for the verification of the Unisa Library's stock of information resources as shown on the library's balance sheet. The end product of an inventory controller's work is checked by an auditor. An auditor can be defined as a person who satisfies himself/herself of the reasonableness and/or correctness of a statement or declaration made by another person or organisation regarding organisational management, including assets (Puttick & Van Esch 1998:1).

In virtue of the stocktaking mandate of the inventory controller the inventory-control function in an academic library includes efficient and effective control over:

- all the steps in the inventory-control process, from the planning stage to the report as the end product,
- administration of the inventory-control exercise,

- the execution of the inventory-control exercise,
- the annual inventory-control budget and costs,
- all staff involved in inventory control, including the number of staff needed,
- the time spent on inventory control,
- maintaining the relevant standards between controllers of the information resources inventory and internal auditors,
- appropriate training of all staff involved in inventory control,
- the statistical inventory-control database (record-keeping), and
- quality-control measures applied to inventory-control activities.

According to Sawyer and Dittenhofer (1996:13-17) the function of internal auditors is to assist the management of an organisation, for example, by investigating, evaluating and monitoring organisational activities and systems on all levels. They also identify business risks and assist with problem solving. The work of the internal auditors helps managers to be more efficient and effective in their management of the organisation. Information-resources inventory controllers have the same responsibilities, except that they are focused exclusively on the verification of information resources as the core business of the academic library.

Inventory control takes place every two years in the Unisa branch libraries. Library staff in the branch libraries will take on the extra task of inventory control for that time of inventory. They are only responsible for the checking of their shelf-lists against the information resources in their branch libraries. They are not regarded as inventory controllers because the rest of the duties of an inventory controller are not their responsibility.

The description of the main activities or key performance areas of an inventory controller in the Unisa Library (2004:1-2) are as follows:

Key performance area 1: Inventory control of library information resources

- Schedule and adapt inventory-control activities.
- Allocate resources to inventory-control teams (eg. preparation of inventory-control files and ordering stationary needed).
- Motivate and evaluate members of the inventory-control teams.
- Identify discrepancies in shelved information resources.

Key performance area 2: Team leadership

- Provide a dynamic team environment through facilitation, advice and guidance, communication, resolution of escalated problems and participative decision-making.
- Performance-manage and develop student workers who form part of the teams who execute inventory control of information resources as and when required.
- Manage team boundaries.
- Provide student team performance reports to the Business Unit Leader: Information Resources Distribution.
- Train members of the inventory-control teams so that they can work independently and interpret findings accurately.

Key performance area 3: Report inventory-control results

- Report results of inventory control to the Unisa Library Service Performance Team, the Unisa internal and external auditors, and the Unisa Library staff by listing numbers, percentages and value of missing items.

Key performance area 4: Input to the Unisa Library Service Performance Team

- Send accurate and timely information regarding inventory-control processes to the Unisa Library Service Performance Team.

Key performance area 5: Design inventory-control procedures

- Define the responsibilities of different role players in the inventory-control process.
- Design complete and understandable processes and quality control measures for library inventory control.

Key performance area 6: Process improvement

- Identify opportunities for improvement of inventory-control processes on an ongoing basis.
- Interpret inventory-control process measurement.
- Investigate process problems to identify root causes, devise alternative ways to resolve the problems, and implement the solution.
- Maintain all documentation referring to processes (eg. process charts and training manuals for delivery at the right time when a process is created, changed or discarded).
- Manage process boundaries.
- Advise and guide the Unisa Library on inventory-control matters.
- Implement planning for new/changed inventory-control processes.
- At all times, remain alert to and utilise opportunities to improve inventory control, for example by benchmarking and doing research to ascertain latest trends in the field of information-resources inventory control.

4.3.5 Inventory-control guidelines

The overall guidelines for inventory control are set by legislation and by university and academic library policies. The Unisa Library's guidelines touch the following areas:

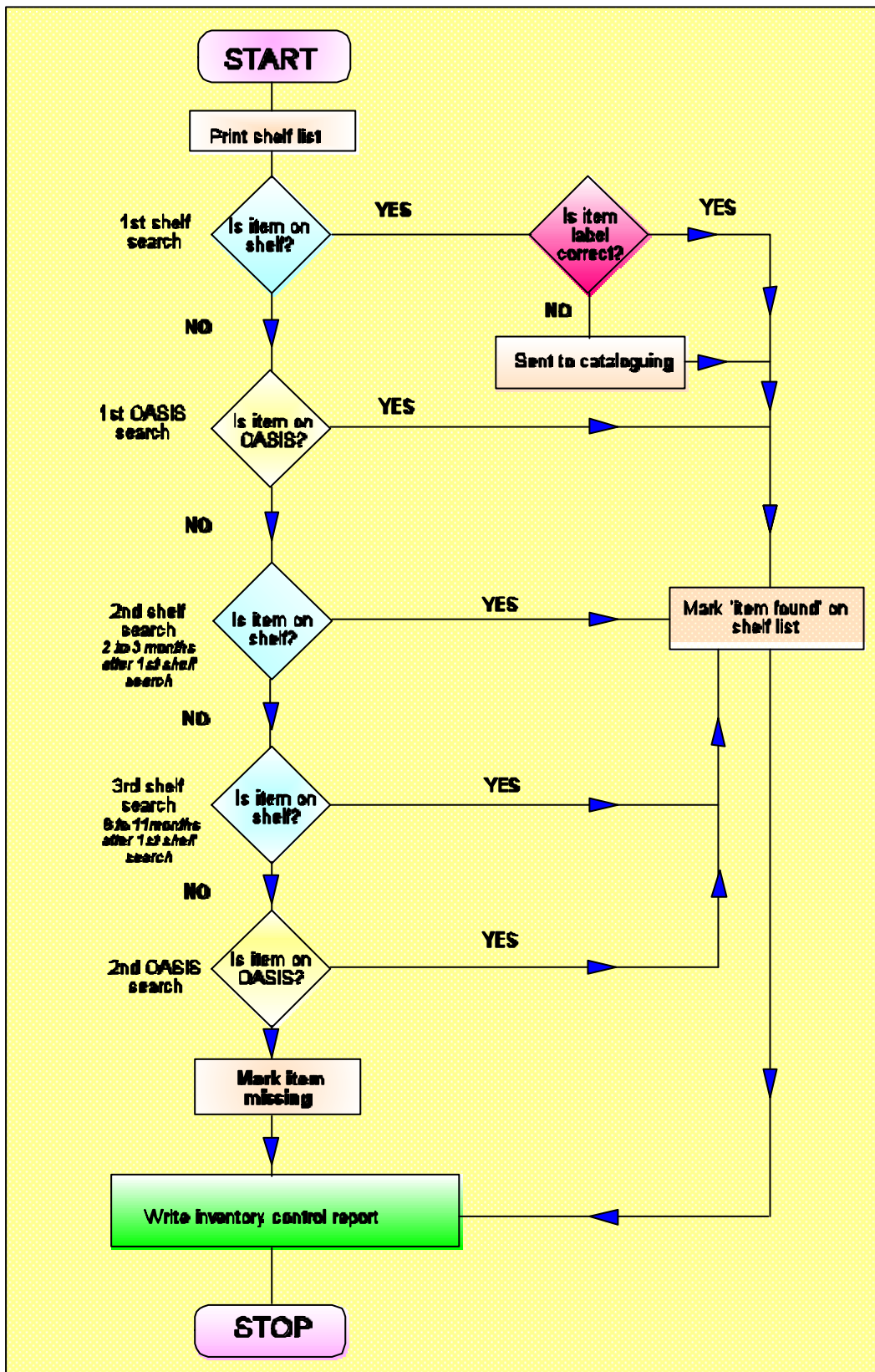
(1) Inventory-control planning

Refers to the daily schedules (workflow charts) for physical and logical inventory-control daily schedules (workflow charts), procedures negotiated between the Unisa Library and the university's auditors and the reports as the end-product. Inventory control consists of different processes, namely:

- Print shelf lists for a particular collection.
- Number printed lists and prepare a well-marked file for it.
- Search for information resources on the shelf (first search).
- Search for information resources not found in the library catalogue (first OASIS search).
- Two to three months later, search for items not yet found on the shelf (second search).
- Eight to eleven months later, search again for items not found on the shelf (third search).
- Finally conduct is a second OASIS search (see figure 4.3).

All findings are captured onto a database and a report for the Unisa auditors and LMC is generated.

FIGURE 4.3
INVENTORY-CONTROL PROCESSES



(2) Quality measures

Quality measures built into the inventory-control system are:

- Numbering of printed list pages.
- Inventory-control processes for every file are indicated on the file spine and on the cover page of the file to be signed off by the responsible person, as well as to be dated (see example of inventory-control file cover page in figure 4.4).

FIGURE 4.4
INVENTORY-CONTROL FILE COVER PAGE

BATCH 1 of 2004
RESEARCH COLLECTION

511.8 TRAV - 515.94 HORM

Task	Initials	Date	Total MOM1	Total MOM2	Total MOM3	Total MOM4
1 st search						
1 st OASIS						
2 nd search						
3 rd search						
2 nd OASIS						
Percentage missing						
Correction on OASIS						
Final report						

511.8 TRAV - 515.94 HORM = DDCS call numbers.

Source: Unisa Library. 2004. Batch 1: Research Collection. (Work document).

- Inventory-control processes are indicated on every page of the printed list for the date and initials of the responsible person (see example of printed list page in figure 4.5).

FIGURE 4.5

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IN	Number	Material	Accession	Call Number	Description
	4845.	OK on shelf	0000010632	841.1 COU	Le Couronnement de
	4850.	OK on shelf	0000637654	841.1 COU	A critical edition
	4851.	OK on shelf	0000251619	841.1 DOC	Doon de la Roche ;
	4852.	OK on shelf	0000904458	841.1 ELL	Anticlaudian ; a th
	4853.	OK on shelf	0000097253	841.1 ENF 2	Roman du XIIe siécl
	4854.	OK on shelf	0000148902	841.1 ENF 1	Roman du XIIe siécl
	4855.	OK on shelf	0001719850	841.1 ENFA GALL	L'arbre et la foret.
	4856.	OK on shelf	0000010196	841.1 ENF	Les Enfants Guilla
	4857.	OK on shelf	0001100555	841.1 ENFA	Les enfants de Je
	4858.	OK on shelf	0001085346	841.1 ENFA DUGS	A fragment of Les e
	4859.	OK on shelf	0000251615	841.1 ENT 1	L'Entree d'Espagne.
	4860.	OK on shelf	0000251616	841.1 ENT 2	L'Entree d'Espagne.
	4861.	OK on shelf	0001705012	841.1 ESTO v.1	L'Estoire del Saint
	4862.	OK on shelf	0001705013	841.1 ESTO v.2	L'Estoire del Saint
	4863.	OK on shelf	0001005099	841.1 ESTO	La estoire de saint
	4864.	OK on shelf	0000108638	841.1 EUS	La Vie de Saint Dus
	4865.	OK on shelf	0000251609	841.1 FLO 1	Florence de Rome :
	4866.	OK on shelf	0000251610	841.1 FLO 2	Florence de Rome :
	4867.	OK on shelf	0001190289	841.1 FLOI CLAI	La rose et le lys :
	4868.	OK on shelf	0000144909	841.1 FRO	L'espinnette amoure
	4869.	OK on shelf	0001375500	841.1 FRO	Meliador ; roman co
	4870.	OK on shelf	0000137558	841.1 FRO 1	Meliador ; roman co
	4871.	OK on shelf	0000137559	841.1 FRO 2	Meliador ; roman co
	4872.	OK on shelf	0000137600	841.1 FRO 3	Meliador ; roman co
	4873.	OK on shelf	0001190220	841.1 FROI	Le paradis d'amour.
	4874.	OK on shelf	0001067509	841.1 GACE ROSE	The lyrics and melo
	4875.	OK on shelf	0001704553	841.1 GARI 3	Garin le Lohereyn /
	4876.	OK on shelf	0000528215	841.1 GAT	C'est d'un meins cu
	4877.	OK on shelf	0000251614	841.1 GAT	Chansons et descort
	4878.	OK on shelf	0000504467	841.1 GAT	Gautier d'Aupais :
	4879.	OK on shelf	0000096250	841.1 GAT 1	Les miracles de Nos
	4880.	OK on shelf	0000131319	841.1 GAT 2	Les miracles de Nos
	4881.	OK on shelf	0000146894	841.1 GAU	Les miracles de Nos
	4882.	OK on shelf	0000190226	841.1 GAU 1	Les miracles de Nos
	4883.	OK on shelf	0000526359	841.1 GAU	Les miracles de Not
	4884.	OK on shelf	0000195301	841.1 GAU	Of the tumbler of C
	4885.	OK on shelf	0000716592	841.1 GAD	Die zelm gedichte d
	4886.	OK on shelf	0001755643	841.1 GAUT SMEE 1	La chevalerie de Gu
	4887.	OK on shelf	0001755644	841.1 GAUT SMEE 2	La chevalerie de Gu
	4888.	OK on shelf	0000097240	841.1 GER 1 Lu	La continuation de
	4889.	OK on shelf	0000197241	841.1 GER 2	La continuation de
	4890.	OK on shelf	0000251618	841.1 GER	Le roman de Pauvel
	4891.	OK on shelf	0001490286	841.1 GIRA	Meliacin, ou, Le ch
	4892.	OK on shelf	0000010618	841.1 GOR	Sormont et Isenbart
	4893.	OK on shelf	0000418608	841.1 GUI	The booke of the py
	4894.	OK on shelf	0000112820	841.1 GUI 1	La chanson de Guill
	4895.	OK on shelf	0000112821	841.1 GUI 2	La chanson de Guill
	4896.	OK on shelf	0000397252	841.1 GUI	Les chansons attrib
	4897.	OK on shelf	0000126495	841.1 GUI	Les chansons de Gui
	4898.	OK on shelf	0000581072	841.1 GUI	Guillaume d'Orange;
	4899.	OK on shelf	0000140455	841.1 GUI	Guillaume d'Orange.
	4900.	OK on shelf	0000010505	841.1 GUI	La Legende de Guill
	4901.	OK on shelf	0000010506	841.1 GUI	La Legende de Guill
	4902.	OK on shelf	0000137594	841.1 GUI 2	Ceuvres
	4903.	OK on shelf	0000137595	841.1 GUI 3	Ceuvres
	4904.	OK on shelf	0000137593	841.1 GUI 1	Ceuvres de Guillau
	4905.	OK on shelf	0000919532	841.1 GUI	The poetry of Willi
	4906.	OK on shelf	0000137893	841.1 GUI 1	The sugar cane
	4907.	OK on shelf	0001379926	841.1 GUI	Guillaume de Palern
	4908.	OK on shelf	0001008837	841.1 GUI	The judgment of the
	4909.	OK on shelf	0001204697	841.1 GUI	The judgment of the

166

22/07/03

mm/19/03

164

Source: Unisa Library. 2004. Batch 1: Research Collection. (Work document).

(3) Organisational support

Organisational support for inventory control consists of:

- The infrastructure elements encompassing the organisation's collections, the available facilities and equipment, as well as the systems and technology used by the university,
- The annual budget for the inventory-control staff, stationery and other resources, such as overalls for student workers.
- The Human Resources Department of Unisa who plays a crucial role in the selection and other human resources activities relating to the student workers.

4.3.6 Inventory-control schedules

The frequency of inventory control in the Unisa Library depends on:

(1) The size of the collection

The larger the collection the longer it takes to complete the stocktaking. Five to ten year intervals between inventory-control exercises are recommended where inventory control has to be done manually in large academic libraries (Adhvaryu 1981:27).

(2) The loss rate of information resources

Regular inventory control becomes increasingly urgent with the vulnerability of collections.

(3) The inventory-control method

Instead of including all items in the collections the sampling method restricts the exercise to selected items from a targeted collection. Electronic inventory-control methods, such as barcode scanning, save time and effort and can be

more frequently.

- (4) The availability of library staff

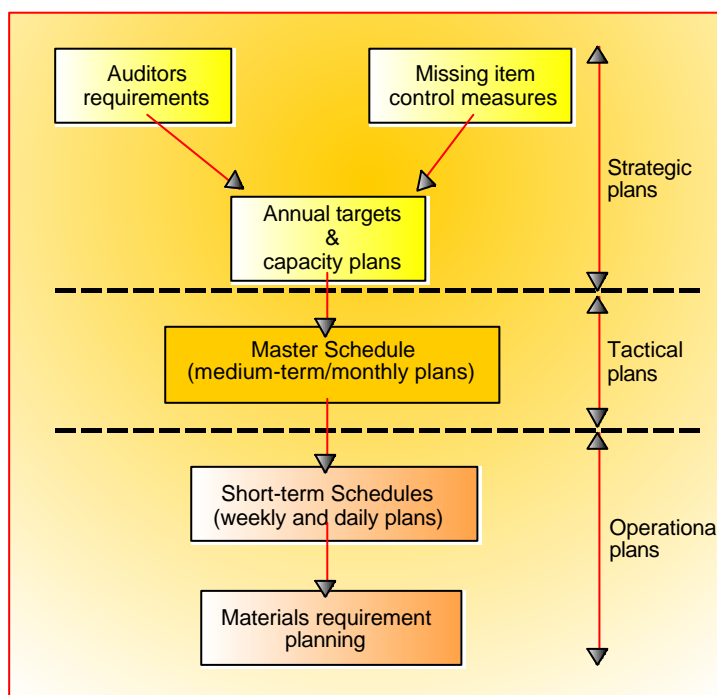
The added responsibility of inventory control increases the work load of academic library staff to an unacceptable level.

- (5) The significance attached to inventory control by the library management and/or auditors

Inventory control will only be done on a regular basis if the library management considers it as an essential library function with substantive benefits for the academic library, and/or if it is called for by the auditors.

In the Unisa Library inventory control is subjected to three kinds of schedules: an annual schedule, the master schedule and short-term schedules (see figure 4.6).

FIGURE 4.6
INVENTORY-CONTROL SCHEDULE STRUCTURE



Only vulnerable collections (eg. the current prescribed items, the reference collection, the Science Library collections) will be scheduled on a yearly basis (see table 4.5).

TABLE 4.5
PART OF ANNUAL TARGET PLAN

Collection	2002	2003	2004	2005
Archives: Thesis				✓
Children's literature item				✓
Compact disk item			✓	
Current periodical				✓
Current prescribe item	✓	✓	✓	✓
Microfilm			✓	
Microfiche			✓	
Reference: Main	✓	✓	✓	✓
Research: Main	✓	✓		✓
Science reference	✓	✓	✓	✓
Science: research	✓	✓	✓	✓
Slide		✓		
Videocassette		✓		

Source: Unisa Library. 2002. Four year annual target plan. (Work document).

A master schedule reflecting the monthly inventory-control plans will be created every year (see table 4.6).

TABLE 4.6
INVENTORY-CONTROL MASTER SCHEDULE

Inventory control (Detailed work schedule) from March to July 2004

✓ = Current search FU = Following from previous year ⇨ = preparation ✕ = OASIS search

Collection	Mar	Apr	May	Jun	Jul
Research	✓1(L4)	✓1(L5)	✓1(L6)	✓1(L7) ✓2 (L5)	✓1(L8) ✓2 (L6) FU ✕1 (L7)
Reference at Information	✓1	✕1	FU	✓2	
Audiovisual	⇨	✓1	FU	✓2	
Current prescribed	FU	✓3	✕2		
Reference	✓2 (L8) ✕1 (L8)	✓3 (L5)	✕2 (L5)	✓3 (L6)	FU ✓3 (L7) ✕2 (L6)
Periodicals (current)	✓1	FU	✕1	✓2	
Science research	✓1	FU	✕1	✓2	
Science reference			✓3	FU ✕2	FU

Source: Unisa Library. 2004. Master schedule: March to July 2004. (Work document).

4.3.7 The role of shelf reading in inventory control

An academic library as a system is discussed in paragraph 2.2 of this study. The concept of a system in this context refers to a group of independent but interrelated academic library functions that form an integrated whole. This implies that inventory control is closely bound up with other functions in the academic library:

- retrieval of information resources,
- the library catalogue,

- weeding, and especially
- shelf reading.

The success of inventory control is critically determined by the existence, or absence, of shelf order. Shelf-list checking can only succeed if the specific shelves contain accurately shelved information resources. Inventory control and shelf reading have the same main aim, namely to facilitate access to information resources.

In 1999, when complete stocktaking of specific collections started in the Unisa Library, it soon became evident that some areas were in desperate need of shelf reading due to:

- high use of collection (eg. latest items on computer programs),
- a large number of small items in the collection (eg. African languages literature), and
- long DDCS numbers (eg. African languages).

Human error (by staff or browsing clients) could not be ruled out when misshelved items were found. The South-African based Gauteng and Environs Library and Information Consortium (GAELIC Consortium) launched an investigation into shelving practices in GAELIC libraries (eg. the Unisa Library and the University of Pretoria Library), with a view to possibly benchmarking shelving within the consortium (GAELIC 2003 : 2). In terms of accuracy GAELIC (2003 : 4) reports: "The majority of libraries reported that the accuracy of shelving was not a problem as only 1 - 10 books per week were inaccurately filed by staff, and to a lesser degree between the ranges of 10 - 50 books. More than 50 books per week were the exception."

The Unisa Library performs yearly shelf reading of all its research, reference and study collections. At first the library staff took responsibility for the annual shelf-reading exercise, but since 2003 it was done by student workers under supervision of the Library Management Research Section.

Shelf-reading evaluations after shelf-reading exercises showed that in a popular subject field with an average of 15000 items, 1000 information resources can be misplaced in a

period of 30 days due to browsing and daily usage (Retief 2004:51). Shelf reading cannot be limited to an once-off annual exercise. In the Unisa Library the shelvers have the responsibility to do shelf reading on a continuous basis in high-use subjects.

4.4 SUMMARY

The Unisa Library was introduced as a case study because it is an academic library with a well-established inventory-control function. The contribution of inventory control to service quality in the Unisa Library will be considered in the ensuing chapter with reference to the outcome of its inventory-control activities from March 2003 to February 2004.

CHAPTER 5

ANALYSIS OF AN INVENTORY-CONTROL PROJECT IN THE UNISA LIBRARY

5.1 INTRODUCTION

The literature study reflected in the preceding chapters forms an important background to the investigation reported in this study. In chapter 2 the concepts of service quality and performance indicators were described in historical context. In chapter 3 inventory control was explored, whilst in chapter 4 the case study was introduced.

The object of this chapter is to identify significant changes in the performance measurements (cf. paragraph 1.3) applied to the Unisa Library before and after inventory control. Chapter 5 serves to explore the benefits that may have been derived from the inventory-control project implemented in the Unisa Library from March 2002 to February 2004.

5.2 PERFORMANCE INDICATORS IN THE UNISA LIBRARY

The Unisa Library summarises the library's performance measurements on the electronic University Library Abridged Management Information System (ULAMIS). This system is divided into the following main sections:

- Part 1: Corporate service performance indicators (eg. availability of study collection books).
- Part 2: "How effectively do we serve our clients?" Example: number of book requests per month.
- Part 3: "How efficient are our processes?" Example: number of book acquisitions per month.

- Part 4: “Key corporate statistics” (eg. library stock, library staff, facilities and resources).
- Part 5: “Annual reports” (eg. financial analysis annual report).

ULAMIS is specifically designed and used for the systematic collection of statistical data on the library's activities and to obtain feedback from clients. It therefore produces an excellent historical record of the library's service-quality performance over a period of time and a very useful aid to management decision-making for the library. It is also an internal baseline or benchmark for the comparison of particular service components with those of other similar academic libraries.

Three main service-quality criteria are investigated for this study, namely:

- access to information resources (the library catalogue, OASIS),
- retrieval of information resources (availability of information resources), and
- management of financial implications of shelf reading and inventory control.

5.3 ACCESS TO INFORMATION RESOURCES

OASIS is scrutinised to detect variations in this service-quality component. Two performance measures are taken as indicative in this regard, namely clients' complaints about the perceived state of the library catalogue before and after conducting inventory control, and the number of changes to the library catalogue after inventory control.

5.3.1 Complaining behaviour (CB) concerning the library catalogue

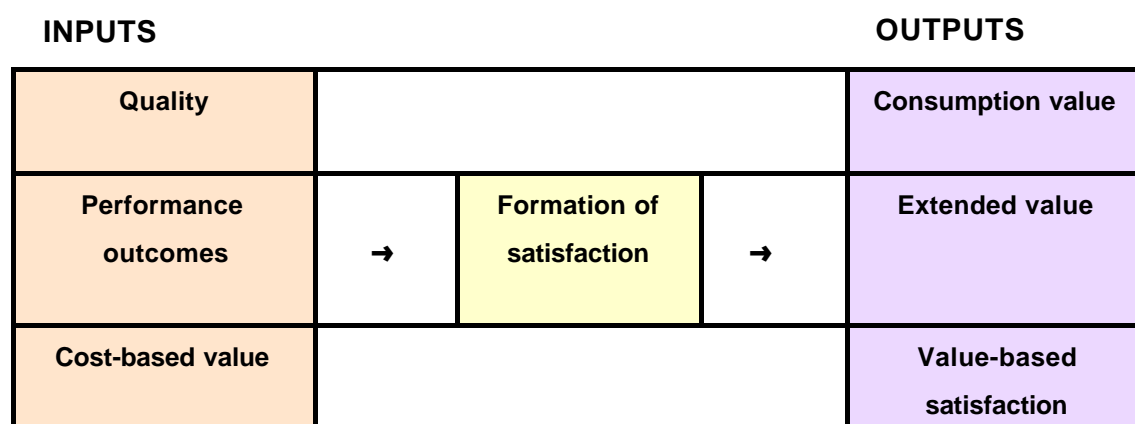
Research done into complaining behaviour (CB), also known as complaint behaviour or complaint responses, usually occurs in a commercial context (Cermak, File & Prince 1991:180) and is closely linked to client satisfaction levels. Oliver (as cited by Hom 2000:101), defines satisfaction as the client's fulfilment response and explains it as follows:

“It is a judgement that a product or service feature, or the product or service itself, provided (or is providing) a pleasurable level of consumption-related fulfilment, including levels of under- or over-fulfilment...”

Usually positive emotions are linked to enhanced satisfaction. Satisfaction as a feeling, is a short-term attitude that can change in an instant, depending on a constellation of circumstances.

Hom (2000:103) expresses the link between satisfaction and value in figure 5.1. The original model, developed by Oliver (as cited by Hom 2000:191) shows that conformity to excellence criteria leads to quality.

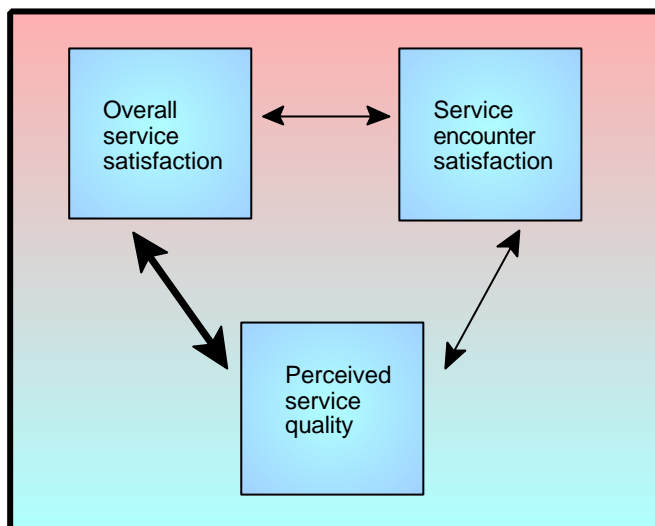
FIGURE 5.1
MODEL OF LINK BETWEEN SATISFACTION AND VALUE



Source: Adapted from Hom (2000:101).

There is a distinction between the overall service satisfaction level of a client and his or her particular encounter service satisfaction. This explains why a respondent can indicate different levels of satisfaction for the same service in a survey questionnaire. For example, the client may be satisfied with the literature list provided by the subject librarian, but dissatisfied with the timeliness of the service rendered. Hom (2000:104) explains this phenomenon in figure 5.2, noting that the overall service performance experienced by the client is the product of more than a single service-encounter experience.

FIGURE 5.2
MODEL OF TWO LEVELS OF SATISFACTION AND
PERCEIVED SERVICE QUALITY



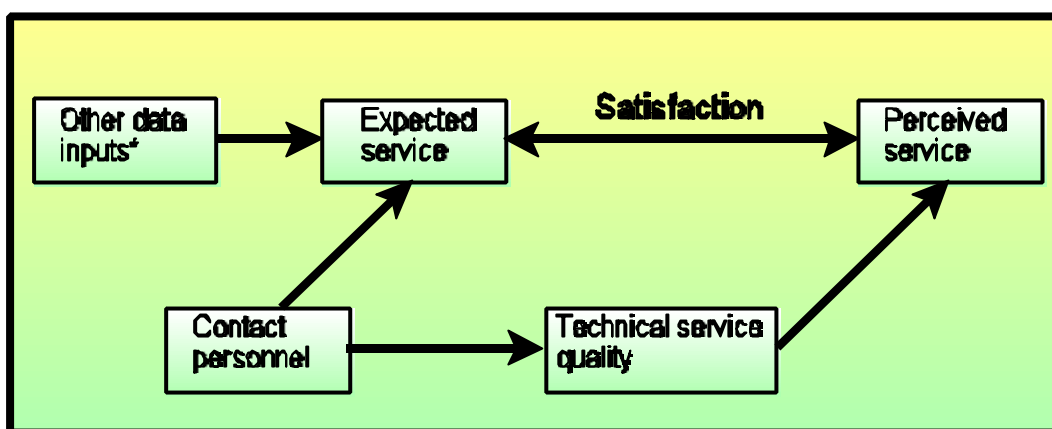
⇕ = stronger influence than ⇓

Source: Adapted from Hom (2000:104).

Every client observes the quality of services offered in different organisations and sectors and compares those service levels with some expected quality level or standard conceived by him or her. This quality level or standard differs from person to person. The comparison of actual service received and the client's "standard" of service quality determines the degree to which the person is satisfied or dissatisfied with the service. The person then decides whether or not to complain about the service received.

A client's dissatisfaction is then expressed in complaints (CB) which is motivated by different factors such as technical service quality and staff behaviour (see figure 5.3).

FIGURE 5.3
MODEL OF SOURCES OF CLIENT SATISFACTION



* Other data inputs, such as a noisy library or a power failure.

Source: Adapted from Hom (2000:104).

According to Köster, Van Hoesel and Kolen (1984:3) complaints “are unfit to measure small amounts of annoyance in a sensitive way. They only occur when a certain threshold of dissatisfaction has been surpassed.”

They also point out that there are marked differences between people’s threshold levels for expressing themselves through complaints. A large part of the population will never complain, while some can be described as habitual complainers. A dissatisfied client might not complain if he or she believed that a complaint would be ineffective (ie. if the client’s expectations for the outcome were low) or that its negative consequences would be too severe (Devereux & Weisbrod 2003:3).

“Complaining behaviour therefore is not representative for the annoyance experienced by the total population” (Köster, Van Hoesel & Kolen 1984:4). Although CB is a poor indicator of the general satisfaction level of a whole population in regard to a specific aspect of business, it is still a good indicator of how clients perceive the quality of a service offered at a given moment.

De Meester and Mahieu (2005:1) describe **complaints** as “critical incidents that define the client’s trust in or relationship with the organisation and which help correct the organisation’s struggle to offer quality service.”

Oh (2003:43) states that existing CB models in the business world are not always directly applicable in academic libraries. He suggests that CB be divided into the following categories when applied to the library and information sector:

- “exit” complaints in the sense of a vow or intention never to visit the particular library again,
- “negative-word-of-mouth” complaints in the sense that clients inform others about their dissatisfaction with the library and/or the service,
- “voice” complaints in the sense that clients complain directly to a library staff member or through a questionnaire response, and
- “third-party” complaints in the sense that clients complain to the organisation but not directly to the library itself.

In this study “voice” complaints about the perceived state of the library catalogue before, during and after inventory control will be considered as noted in questionnaire responses.

A questionnaire consists of a set of well-formulated questions. Each question measures some aspect relevant to the particular survey, for example a client satisfaction survey in regard to the general information-desk services in an academic library. The responses to the questions represent three types of question format:

- open-ended, also called open questions,
- multiple-choice, also known as polychotomous questions, and
- dichotomous questions.

Multiple-choice and dichotomous questions always produce closed or fixed answers from the respondent (eg. a yes or no answer to the question: “Do you have access to a computer at home?”). Open-ended questions give total freedom to the respondent to express his or her view, opinion or attitude regarding an issue. Responses may vary from short answers to lengthy discussions (Whitney 1972:5-7).

The most important advantage is the freedom that an open-ended question gives the respondent to express his or her ideas spontaneously without being influenced by the alternatives provided in the questionnaire. Unfortunately it is difficult for a researcher to categorise and analyse these answers, and the result is usually a subjective measurement.

Most questionnaires used in the Unisa Library end with the following open-ended prompt: “Any further comments?” This question often leads to irrelevant information. Specific complaints about some aspect of the Unisa Library services, such as the library catalogue are usually listed. The three types of written complaints about OASIS as noted from all survey research done from 2001 to 2004 about OASIS are listed in table 5.1.

TABLE 5.1
COMPLAINTS ABOUT OASIS : 2001 TO 2004

YEAR	OASIS slow	Not enough computers available to access OASIS	According to OASIS items are available but cannot be found on the shelf	TOTAL NUMBER OF COMPLAINTS FOR THE YEAR
2001	12	14	14	40
2002	7	13	15	35
2003	14	23	5	42
2004	12	31	2	45

Source: All survey research done by the Unisa Library during 2001 to 2004.

Increasing complaints are received that OASIS is slow and that the number of computers available to access OASIS are insufficient. The latter complaint is often accompanied by an appeal for more computers to access the Internet. The frequency of a further complaint

that information resources that should be available for use according to OASIS cannot be found on the shelf by clients and library staff alike has declined dramatically as inventory control progressed from 2001 to the present and specifically during March 2003 and February 2004.

The deficiency of the data complicates the interpretation of the empirical work, but overall it seems as if inventory control, with its component of shelf reading as a first step in the process, has caused a dramatic improvement in clients' perception of how accurately OASIS reflects the availability of items on the shelf.

5.3.2 Number of changes to OASIS

The Unisa Library Management Services kept a record from March 2002 to February 2004 of the number and type of changes made to OASIS as a direct result of inventory control. The different kinds and respective numbers of changes are shown in table 5.2.

TABLE 5.2
OASIS CHANGES FROM MARCH 2002 TO FEBRUARY 2004

Type of problem corrected on OASIS	Number of problems
Call number incorrect on item or on OASIS	2 564
Location of item incorrect on OASIS	299
Status of item incorrect on OASIS (eg. according to OASIS item is on shelf, but item is in the bindery)	1 115
Items in collection, but not reflected on OASIS	4 592
Items with no accession number	15
Items in original accession records, but not on OASIS	1 137
Items marked missing on OASIS	17 480
TOTAL	27 202

Source: Retief (2004:63-69).

The changes made on OASIS, which brought the total to 27 202, played an important role in ensuring an up-to-date library catalogue for the reference and research collections in the Unisa Library. These changes help restore the integrity of the library catalogue.

5.4 RETRIEVAL OF INFORMATION RESOURCES

A performance indicator that is directly related to the retrieval of information resources is availability studies and the results of this performance measure will be considered for this study.

Secondly, the number of misplaced information resources corrected during the inventory-control project, as well as complaining behaviour in this regard before, during and after inventory control have been investigated.

5.4.1 Availability studies

Numerous studies of availability and availability fill rates have been conducted in the Unisa Library since they were introduced in the late 1970s as a service-quality performance indicator.

Availability “deals with the balance of supply and demand of library material. It is defined as the proportion of the material requested by the user that can be used in the library (including copying) or taken home immediately” (Poll & Te Boekhorst 1996:84).

Documents that need to be retrieved from closed stacks are also considered as available, although it does take time to retrieve. The purpose of this performance measurement is to establish to what extent the library can satisfy a client’s immediate information need. In other words, can the clients find promptly the information resources what they are looking for.

In the Unisa Library one day is set aside on a quarterly basis for a general availability survey (see appendix A for the questionnaire). A library staff member asks every client leaving the academic library how many items he or she was looking for. The staff member will also ask the client to list the information resources for which they searched and could

not find. It does not matter whether a client came to the academic library with a specific item in mind or the client identified items during a search of the library's catalogue and indexes.

The items that were not found by clients are followed-up by library staff to determine the reason for the clients failure in retrieving the needed information resource. The reasons for non-availability show some consistency over the years and can be categorised as follows:

- Failure to find the item on the shelf due to:
 - the item is already issued,
 - the item is on interlibrary loan,
 - the item is in the cataloguing process,
 - the item is on order but not yet received by the library,
 - the item is in transit between Unisa branch libraries,
 - the item is withdrawn from the library stock,
 - the item is missing, or
 - the item is available but not found on shelf.

- Failure to find the item on OASIS due to:
 - the item is not part of the library stock.

- Clients have insufficient or incorrect information regarding the information resource needed.

Kantor's (1976a & 1976b) research into availability and its measurement are the basis of numerous availability studies performed by academic libraries. Any academic library client needs to overcome four barriers to successfully locate an information resources, namely:

- an acquisition barrier (is the information resource part of the academic library's collections?),

- a circulation barrier (is the information resource available for use?),

- a library barrier (is the information resource, with a clear call number, correctly shelved in the proper collection?), and
- a client barrier (can the client locate the information resource on the shelf?).

The Unisa Library's availability studies are based on Kantor's (1976a) availability performance measurement design used at Case Western Reserve University, but differs in two aspect, namely:

- the measurement includes all kinds of information resources, regardless of medium, and
- the components of the barriers are tailored to the Unisa Library's setup (see table 5.3).

TABLE 5.3
KANTOR'S BARRIERS AND THEIR COMPONENTS TAILORED
TO THE UNISA LIBRARY SETUP

Barriers to overcome	Symbol	Description
1. Items not part of the library collection Acquisition barrier = DA $DA = A_1 + A_2 + A_3$, eg. $DA = 61 + 4 + 1 = 66$	A_1	Items not own at this site and not on order at this site, eg. 61 items.
	A_2	Items on order, but not yet part of collection, eg. 4 items.
	A_3	Items withdrawn at this site, eg. 1 item.

<p>2. Items in stock, but used by client(s).</p> <p>Circulation barrier = DC</p> <p>$DC = C_1 + C_2 + C_3$, eg. $DC = 74 + 3 + 1 = 78$</p>	<p>C_1</p> <p>C_2</p> <p>C_3</p>	<p>Item taken out by a client (ILL included), eg. 74 items.</p> <p>Item on hold shelf, eg. 3 items.</p> <p>Item used by a client in the library such as a video watched, eg. 1 item.</p>
<p>3. Items in stock and not circulating, but not in correct location due to library error.</p> <p>Library barrier = DL</p> <p>$DL = L_1 + L_2 + L_3 + L_4 + L_5$, eg. $DL = 1 + 1 + 2 + 1 + 7 = 12$</p>	<p>L_1</p> <p>L_2</p> <p>L_3</p> <p>L_4</p> <p>L_5</p>	<p>Item location and its library catalogue location differs, eg. 1 item.</p> <p>Item in process, excluding ordered items, eg. 1 item.</p> <p>Item in pre-shelving, eg. 2 items.</p> <p>Item in bindery, eg. 1 item.</p> <p>Item not found on shelf, eg. 7 items.</p>
<p>4. Items not found due to client error.</p> <p>Client barrier = DU</p> <p>$DU = U$, eg. $DU = 41$</p>	<p>U</p>	<p>Item correctly catalogued and properly shelved not found by client, eg. 41 items.</p>

The steps in calculating the over all probability that a client locates an information resource sought are as follow:

Step 1: Determine the total number of items indicated on the questionnaire, eg. 493 items.

Step 2: Subtract the number of items invalid such as incorrect or insufficient information to identify the information resource), eg. 11 items.

Step 3: Determine the total number of items surveyed (W), eg.:
W = clients were looking for 482 items (in other words, the sample size).

Step 4: Determine the total number of items found by the clients (S):, eg.:

$$\sum_{i=1}^n x_i$$
, where i = a client's response in regard to the number of items found,
 eg.
 S = 285 items found.

Step 5: Determine the total number of items not found by the clients:, eg.:

$$\sum_{i=1}^n x_i$$
, where i = a client's response in regard to the number of items not
 found, eg.
 items not found = 197 items (the barriers represented by these 197 items are indicated in table 5.3).

Step 6: Calculate the probability of acquisition (P_A) as $V \div W$ to the fourth decimal, where $W = V + DA$, eg.:
 $V = W - DA = 482 - 66 = 416$ and
 $P_A = V \div W = 416 \div 482 = 0.8631$ (86%).

Step 7: Calculate the probability that an owned item is not circulating (P_C) as $U \div V$ to the fourth decimal, where $V = U + DC$, eg.:
 $U = V - DC = 416 - 78 = 338$ and
 $P_C = U \div V = 338 \div 416 = 0.8125$ (81%).

Step 8: Calculate the probability that an owned item is not circulating and is correctly shelved (P_L) as $T \div U$ to the fourth decimal, where $U = T + DL$, eg.:

$$T = U - DL = 338 - 12 = 326 \text{ and}$$

$$P_L = T \div U = 326 \div 338 = 0.9645 \text{ (96\%).}$$

Step 9: Calculate the probability that a client has correctly locate the owned item on the shelf (P_U) as $S \div T$ to the fourth decimal, where $T = S + DU$, eg.:

$$S = T - DU = 326 - 41 = 285 \text{ and}$$

$$P_U = S \div T = 285 \div 326 = 0.8742 \text{ (87\%).}$$

Step 10: Calculate P_S as $P_A P_C P_L P_U$, eg.:

$$P_S = 0.8631 \times 0.8125 \times 0.9645 \times 0.8742 = 0.5913 \text{ (59\%).}$$

\therefore there is a 59% probability that a client can locate an information resource on the shelf.

Step 11: Determine the availability study mean success rate percentage for a specific year. In other words, calculate the mean for the four availability studies in one year by using the following statistical formula:

$$\bar{x} = (1 \div n) \sum_{i=1}^n x_i,$$

For example:

First quarter: $x = 56$ $n = 391$

Second quarter: $x = 24$ $n = 420$

Third quarter: $x = 37$ $n = 438$

Fourth quarter: $x = 29$ $n = 346$

$\therefore \sum x_i = 146$ items not found.

$\therefore N = 1\,595$ items searched for by clients.

$$\begin{aligned} \bar{x} &= (1 \div 1\,595)(146) \\ &= 0.0915 \end{aligned}$$

The success rate percentage is $100 \times \bar{x} = 9.15\%$

100% - \bar{x} = 90.85% success rate for the year.

Step 12: Determine the accuracy level (h) of the sample on a 95% confidence level ($Z_{\alpha} = 1.960$) by using the following statistical formula:

$$h = Z_{\alpha} \sqrt{p(1-p)} \cdot \sqrt{\frac{1}{n} - \frac{1}{N}}$$

where n = sample size (number of information resources needed)

N = total collection size

p = calculated proportion ($n \div N$).

The availability surveys also include questions on the satisfaction level of clients with their visit on that specific day.

For this study the general availability studies conducted in the main campus of Unisa Library in Pretoria were considered. These studies include only clients who personally visit the library. The Unisa Library conducted availability studies since 1986. The results of all general availability studies from 2001 to 2004 are indicated in tables 5.4.

TABLE 5.4
RESULTS OF THE UNISA LIBRARY GENERAL AVAILABILITY STUDIES :
2001 TO 2004

Year	Q 1	Q 2	Q 3	Q 4	Total sample size	Satisfaction rate expressed in percentage
2001	90.9%	79%	88.9%	93.6%	434	88.2%
2002	87.3%	94%	83.4%	97.4%	342	89%
2003	88.1%	93.4%	86.1%	88.7%	326	89.8%
2004	83.9%	81.9%	91.9%	95.7%	1 056	88.1%

Q = Quarterly measured satisfaction level expressed in percentage

The average accuracy level (h) on a 95% confidence level ($Z_{\alpha} = 1.960$) indicated that the accuracy level for a particular sample is usually $h = 0.03$, while for all four samples in a year $h = 0.02$. In other words, a sample for a specific sample will have a moderately high accuracy level, with an inclination for a high accurate estimate for a year's sample total.

As the inventory-control project of the whole research and reference collections were conducted from March 2003 to February 2004, the means of the total sample sizes of 2001 (the availability study before the inventory-control project was implemented), 2002 and 2003 (the availability studies during inventory control), and that of 2004 (the availability study after the inventory-control project was completed) were compared.

The conclusion is that there seems to be no significant difference in the end results of the individual availability study's outcomes.

5.4.2 Shelf order

To ensure shelves are in good order, shelf reading is unavoidable. Attention to detail, an ability to work accurately and a good grasp of the DDCS are crucial characteristics of a competent shelf reader. Unfortunately shelf reading is a labour intensive and high burnout activity.

During the first year of the inventory-control project of the research and reference collections of the Unisa Library in Pretoria (2002), the inventory controllers found that the disorderly shelves created major problems for finding the needed information resource. During the inventory-control project of March 2003 to February 2004, 10 781 items were re-shelved in their correct order on the shelf as a direct result of inventory control (Retief 2004:63).

In September 2003 student workers were appointed to help with shelf reading.

Complaints about disorderly shelves expressed in questionnaire responses are shown in table 5.5 and cover the period 2001 to 2004.

TABLE 5.5
WRITTEN COMPLAINTS ABOUT THE DISORDERLY STATE OF
THE SHELVES FROM 2001 TO 2004

YEAR	2001	2002	2003	2004
Number of complaints	28	3	8	5

The shelf-reading project did result in tidier, more orderly collections. It improved availability of items and clients found it easier to retrieve desired items. The CB decreased drastically in regard to the state of the shelves during 2002 and 2003.

5.5 SOUND FINANCIAL MANAGEMENT

The Unisa Library is under pressure to be a good steward of their annual budget. To determine whether sound financial management principles were applied in regard to the inventory-control and shelf-reading projects it is necessary to investigate two aspects, namely:

- the cost of inventory control in relationship to the benefits derived from this function
- the cost of shelf reading in relationship to the resulting benefits from this task.

The first step was to calculate the total cost of each of these projects. The second step was to determine the number of information resources handled to pinpoint the average cost of checking an item during the inventory and the shelf-reading processes. The final step is to list the benefits derived from these two projects.

The cost aspects of the inventory-control project is listed in table 5.6 and covers the time span March 2002 to February 2004.

TABLE 5.6
COST OF THE INVENTORY-CONTROL PROJECT:
MARCH 2002 TO FEBRUARY 2004

Aspect	Cost
All staff involved in the inventory control	R1 023 924.00
5 boxes A4 Paper (500 pages per box)	R1 400.00
69 files	R1 339.98
75 pens	R105.00
50 highlighters	R298.00
TOTAL COST	R1 027 066.90

The cost of the shelf-reading project only includes the salaries of the staff involved and was R320 982.00.

The next step in the investigation was to determine the number of items involved in these two projects and the cost per item handled. During March 2002 to February 2004 a total of 1 863 226 items were handled, while 1 952 554 information resources were checked during March 2002 to February 2004.

This means that to check one item during inventory control will cost 27c
 (ie. R1 027 066.90 ÷ 3 815 780 items).

Shelf reading involved a total of 3 052 673 items during the same 2 year period. To shelf read an information resource costed the Unisa Library 11c
 (ie. R320 982.00 ÷ 3 052 673 items).

The average price for replacing a book in 2003 was R458.00.

The total number of information resources corrected from March 2002 to February 2004 amounted to 38 258 items.

The cost to make one missing information resource again available cost the Unisa Library R35.24.
(ie. R1 348 048.90 ÷ 38 258).

Sixty percent of lost items are usually items in high use and/or items still in print. To replace just half of these 38 258 corrected items would have cost the Unisa Library a staggering amount of R17 522 164.00.

The conclusion reached is that it was more cost effective to locate the 38 258 information resources through inventory control and shelf reading than repurchasing them.

5.6 BENEFITS OF INVENTORY CONTROL

The benefits of inventory control are touching different aspects in the Unisa Library, namely benefits for:

- collection management
- security
- clients
- library staff.

5.6.1 The benefits for collection management

- Misplaced, misshelved and missing information resources are recovered.
- Items in need of maintenance are identified, such as items in need of re-binding.
- Mutilated information resources can be located.
- Missing items that are still considered as essential are identified for procurement.
- Inventory control add regular dusting of the information resources.

- Incorrect call numbers can be corrected and missing call numbers from items can be replaced.
- Overcrowded shelves can be rectified by coordinated shifting efforts of information resources.
- Inventory controllers detect books that have been pushed back behind other or have fallen between shelves.
- Books are evenly aligned for an orderly appearance of the shelves.
- The library catalogue can be updated to reflect the holdings of the academic library.
- Inventory control improves library services, such as retrieving of items when needed.
- Unprocessed items in the collections can be identified.
- Items returned by clients but library catalogue indicated differently can be retrieved.
- The results of inventory control support space planning by providing correct collection sizes.
- Inventory control provides concrete information for the library management to make operational and financial decisions regarding collection management.

5.6.2 Security benefits

- Trends in information resource loss can be identified.
- Vulnerable items in need of special protection are identified that will help minimise library loss.
- Establish estimated cost of missing items.

5.6.3 Benefits inventory control hold for clients

- Clients access an up-to-date library catalogue.
- Less items indicated as missing on OASIS.
- When OASIS indicates that an information resource is available, it is usually in its proper place on the shelf. In other words, inventory control enhanced the accuracy level of OASIS.
- Shelves are neat and in order.
- It is easier to retrieve a desired information resource from the shelves.
- Less frustration is experienced by clients to retrieve an item.
- Inventory control helps improve client satisfaction.

5.6.4 Benefits to staff

- Inventory control improves the efficiency of staff to locate an information resource.
- Staff can render a professional service and ensure client satisfaction.
- It can help improve pride in their library and the service they rendered.

5.7 SUMMARY

The objective of this chapter was to investigate and make assessment of the influences of inventory control towards service quality in the Unisa Library. Three major areas were explored, namely access to information resources, retrieval of information resources and the financial implications of inventory control. The majority of findings point to a positive enhancement of service quality in regard to the three areas under investigation.

CHAPTER 6

SUMMARY, FINDINGS AND RECOMMENDATIONS

6.1 INTRODUCTION

The primary purpose of this study was to investigate the role of an inventory-control project in service quality in an academic library. A summary of the content and results of the investigation will be presented in chapter 6 .

6.2 SUMMARY OF CONTENTS

A considerable variety of perspectives have been generated with respect to the concept of service quality. The difficulty associated with this concept increases exponentially with attempts to clarify it with the aid of concrete definitions and measurements, because the meaning content of service quality changes with context.

In chapter 2 of this study it was established that the concept of quality has evolved with designated processes in the commercial world to client-focused management in the services sector.

The first aim of this study was to provide an overview of service quality. To accomplish this aim, service quality in academic libraries was described against the background of the developments in regard to service-quality measurement in the commercial sector.

6.2.1 Service quality in the commercial sector

Traditionally commercial organisations were conceptualised as legal entities that existed for the purpose of satisfying a need that individuals cannot satisfy by themselves. Potential success in an organisation was, and still is, closely linked to the effective interdependency of functions within the organisation to fully leverage the organisation's assets (ie. human, information, financial and physical).

For a variety of reasons, such as technological advancements and global competition, organisations were subjected to increasing pressure to measure and, therefore, to improve their performance. Managers had the complex task to choose appropriate performance indicators for their respective organisations, and to implement them in a systematic way. Moreover, the managers needed to evaluate the performance measures' impact internally and externally.

New management practices, such as TQM, LP, BPR and OC, were implemented in a bid to ensure optimum performance. These management initiatives sometimes entailed substantial changes in processes, practices, technologies, and measures of success. To keep pace with new management practices, organisational performance measurements have been broadened during the 1990s, away from the traditional financial performance indicators towards the use of 'portfolio' approaches (eg. the EFQM Excellence Model and the Balanced Scorecard).

The international standards subsumed under ISO 9000 have also been a fundamental instrument of global unification for quality systems in the commercial world.

6.2.2 Service quality in the academic library

Academic libraries are part of universities, colleges or technikons, and thus many of their organisational components are based on organisational aspects of their parent institutions. As service entities, academic libraries do not create budgetary resources but consume them. Consequently, they are under constant pressure to justify their expense and demonstrate high service quality. Support from the parent organisation is the basis for success of the academic library. Consequently the academic library fails as an organisation in the event of an assessment that it does not meet the information needs of the academic community.

The traditional hierarchical structures of academic libraries (ie. departmentalised and many times heavily structured) did not allow them to change their services quickly enough to keep pace with the rapid changes in technology, new budgetary constraints, global competition, increasing diversity of employees, an increased demand for access to proliferating sources of information in a variety of formats, and a demand for measurable outcomes. As a result, new management approaches were adopted with enthusiasm from the commercial sector (eg. BPR) and new performance measures were developed for the

academic library (eg. LIBQUAL^{+TM} based on SERVQUAL).

Unfortunately, no generalised international standard for academic library performance exists and each individual academic library identifies performance indicators that are important to the parent organisation. Performance measurement in academic libraries originally only measured input and processes, but in the 1990s it changed over to outcome and impact measurement.

Since the early 1980s South African organisations, including higher-education institutions, have been exposed to increased levels of international and domestic competition. The Unisa Library, as one of the larger South African academic libraries, has implemented a variety of performance measurements over the past 15 years in response to the universal demand for improved service quality. It is also in the process of BPR that will result in a flat structure, and library processes have been designed with a view to optimise service delivery and client satisfaction. It is believed that the envisaged flat structure will enable the Unisa Library to respond more effectively to rapid environmental changes.

In the present context of higher education in South Africa, academic libraries, including the Unisa Library, are experiencing a new national education strategy and policies as major transformation processes, such as mergers. Emphasis is placed on transparency and accountability to all stakeholders. Moreover, South African academic libraries are experiencing enormous pressure because despite budget constraints they have to contend with a demand for high-standard services.

Although South African academic libraries are continually under pressure to measure the performance of their organisations, there is little empirical evidence about the impact of measurement on performance.

6.2.3 Inventory control

The second aim of this study was to define inventory control and examine its methods and processes in a specific academic library. Inventory control was defined in paragraph 3.3 as the process and activities of confirming the physical presence of all information resources in an academic library collection.

The main purposes of inventory control are to keep the library catalogue up to date so that it accurately reflects the academic library's holdings, to identify information resources that cannot be retrieved as a result of theft, mutilation, or for other reasons (eg. incorrect call number), and to predict vulnerable items.

The rate of loss and the problem of locating items on the shelves are not always reconcilable. A loss rate is typically indicated after the initial search for specific information resources. It is then reduced after shelf reading and repeated searching. Losses over a whole collection generally range from just under 1% to well over 10% depending on the discipline, the geographical location, and the security measures in use. The titles that are lost are generally of current interest and still in print.

Traditionally regular inventories of vulnerable collections (eg. reference or CD collections) were only conducted manually in academic libraries with large collections (ie. more than 100 000 items). Random sampling in a particular collection was an acceptable and preferred inventory-control method, but the trouble with this method is that instead of indicating exactly which information resources are lost, it only reflects missing items as a percentage of total holdings, with the result that it cannot be used as a guide in acquiring replacements or pinpointing problem areas within a collection.

By stark contrast the time- and labour-saving attributes of the latest inventory-control methods (eg. RFID) have reduced inventory-control costs dramatically.

6.3 SUMMARY OF THE CASE STUDY

For the present purposes it was decided to undertake an empirical case study to determine the impact on service quality of manual inventory control conducted at the Unisa Library from March 2002 to February 2004.

Three main academic library service goals were chosen, namely access to information resources, retrieval of items and the financial implications of inventory control. Specific service-quality components that are closely associated with inventory were identified under each of the three service goals chosen. Existing service-quality performance measures applied by the Unisa Library were then selected for investigation as indicated in table 1.1.

The complaining behaviour of clients was the first indicator to be used as a measure of service quality in relation to the Unisa Library catalogue. It was noted that client complaints decreased over the relevant time period especially about items that were not found on the shelf although they were indicated on OASIS as available. On the other hand dissatisfaction increased about the slowness of the computerised library catalogue.

The phenomenal number of changes to the library catalogue (ie. 27 202 item changes) during the inventory-control project is clear evidence that this performance indicator benefited most from the exercise. In fact, one of its main end-results was an up-to-date library catalogue, which is naturally a key requirement for a main function of academic libraries, namely to provide access to information resources.

In table 6.1 the results of the investigation are analysed in regard to access to information resources:

TABLE 6.1
ACCESS TO INFORMATION RESOURCES

Service-quality goal	Service-quality component	Performance measure
Access to information resources	Library catalogue	<ul style="list-style-type: none"> • Client complaining behaviour in regard to the perceived state of the library catalogue before and after inventory control. <p style="margin-left: 20px;">CB decreased drastically.</p> <ul style="list-style-type: none"> • Number of changes to library catalogue after inventory control. <p style="margin-left: 20px;">A total of 27 202 items were corrected on OASIS.</p>

It can be concluded that inventory control improved the access to information resources, because OASIS was more up-to-date.

Two service-quality components were selected to investigate retrieval of information resources as a service-quality goal, namely availability of information resources and shelf order. Observing the outcomes of general availability studies from 2001 to 2004 it is clear that there was no significant difference.

Shelf order was a major complaint in the Unisa Library before inventory control started. Inventory control of a specific collection is always preceded by shelf reading. Although client complaints did decrease it is not really possible to conclude that inventory control alone was the cause. Rather it is a combination of shelf reading and inventory control, but their influence is not divisible into exactly proportioned separate components from the available empirical data.

The results of the case study in regard to the retrieval of information resources in the Unisa Library is shown in figure 6.2.

TABLE 6.2
RETRIEVAL OF INFORMATION RESOURCES

Service-quality goal	Service-quality component	Performance measure
Retrieval of information resources	Availability of information resources	<ul style="list-style-type: none"> • Quarterly availability study outcomes (number of information resources that are immediately obtainable) before and after inventory control. <p style="color: blue;">The difference in outcomes is not significant.</p>
	Shelf order	<ul style="list-style-type: none"> • The number of misplaced information resources corrected during the inventory-control project of March 2002 to February 2004. <p style="color: blue;">A total of 10 781 items were re-shelved as a direct consequence of inventory control. Shelf reading of all collections of the Unisa Library was implemented again as an annual activity since September 2003 as a direct consequence of the inventory-control project.</p> <ul style="list-style-type: none"> • Client complaining behaviour concerning the order of information resources on shelves before and after inventory control. <p style="color: blue;">CB decreased drastically since 2002.</p>

It can be concluded that inventory control, as well as shelf reading, played a positive role in improving the retrieval of information resources in the Unisa Library.

The final determinant of service quality at the Unisa Library that formed part of this study was the financial implications of inventory control. The costs of inventory control and shelf reading, as well as the cost of retrieving a missing item and of shelf-reading an item, were considered.

A summary of the financial implications is seen in figure 6.3.

TABLE 6.3
FINANCIAL IMPLICATIONS OF THE INVENTORY-CONTROL PROJECT

Service-quality goal	Service-quality component	Performance measure
Sound financial management	Inventory control	<ul style="list-style-type: none"> • Total cost incurred. <p>The total cost of the inventory-control project amounts to R1 027 066.90 for the period March 2002 to February 2004.</p> <ul style="list-style-type: none"> • Cost per missing information resource found. <p>To check an inventory-control item costs the Unisa Library 27 cents.</p>
	Shelf reading as prerequisite step for inventory control	<ul style="list-style-type: none"> • Total cost incurred. <p>The total cost of shelf reading amounts to R320 982.00 for the period March 2002 to February 2004.</p> <ul style="list-style-type: none"> • Cost per information resource checked on shelf and corrected if needed. <p>To shelf read an item costs the Unisa Library 11 cents.</p> <p>Benefits from inventory control.</p> <p>A total of 27 major benefits were identified closely linked to collection management, security, the clientele and the Unisa Library staff members.</p>

The cost of checking an item in the research or reference collection was calculated as 27 cents per item, while that of an item to be shelf-read was 11 cents. In 2004 the average cost of replacing a book in the Unisa Library was R430. The cost to make one missing item again available through inventory control and shelf reading is R35.24.

A misplaced item is simply not available. Considering the number of unretrievable items recovered, therefore, the inventory control undertaken during March 2002 to February 2004 was evidently a highly profitable venture.

This chapter ended with an extensive list of benefits derived from the inventory-control project.

6.4 LIMITATIONS OF STUDY

This endeavour was sustained by the hope that the research results would not only extend the conceptual content of “service quality” and “inventory control” in an academic-library context, but would serve as an inducement to conduct an empirical investigation into the impact of inventory control on service quality.

The findings from this study may be limited to academic libraries in similar settings. Service-quality determinants selected for this study were measured as the aggregate of their attribute components. In this context all attributes were given equal weight in the components. This approach obscures the possibility that any single performance indicator (eg. CB) may be a more important determinant of service quality when compared to the rest of the chosen indicators (eg. the availability of an item).

The influence of various situational variables on the investigation was not determined in this study. At least three major situational variables were not considered:

- Library condition at the precise moment of the performance measurement, such as poor lighting in a specific area when a client is looking for a specific item on the shelf, with the result that the client fails to retrieve the item.
- Library client behaviour while inventory control is in full swing (eg. the browsing client removes a specific information resource from its proper position on the shelf after shelf reading has been done, but before inventory control can reach it).

- Re-cataloguing of information resources in a particular discipline while inventory control is done in that collection.

6.5 RECOMMENDATIONS

Continue with inventory control, but urgently research the possibility of implementing the latest available technology, such as RFID. The use of such technology will drastically reduce the cost of inventory control and shelf reading while enhancing the accuracy of inventory control and shelf reading.

Continue to keep relevant statistics on inventory control and shelf reading in order to compare and benchmark quality internally and with similar academic libraries.

Explore the use of computer-based instruction to train new inventory controllers and shelf readers.

The influence of situational variables on inventory control and service quality should be investigated in future research.

Research is needed into the use of CB to enhance the service quality of the Unisa Library.

6.6 FINAL REMARK

The mandate of this study was to investigate the contribution of inventory control to service quality in an academic library. Overall, the conclusion can be drawn from the findings of the case study that the service quality of the Unisa Library definitely improved as a result of inventory control.

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