THE RELATIONSHIP BETWEEN THE ACTIVITY AND IMPACT TRAINING APPROACHES AS USED IN SELECTED SOUTH AFRICAN FOOD MANUFACTURING COMPANIES IMPLEMENTING TOTAL QUALITY MANAGEMENT

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This dissertation represents the student's own work

MELANIE ELIZABETH LOURENS 6 March 2000

THIS DISSERTATION IS DEDICATED TO

THE STAFF

AT THE HUMAN RESOURCES MANAGEMENT DEPARTMENT,

TECHNIKON NATAL,

IN APPRECIATION FOR THE

SUPPORT, GUIDANCE AND ASSISTANCE

THAT THEY HAVE GIVEN TO ME

OVER MANY YEARS.

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ABSTRACT

The aim of this investigation is to establish the relationship between the Activity and Impact training approaches in selective South African food manufacturing companies in order to establish which training approach makes the greatest contribution to a Total Quality Management implementation strategy.

The main characteristics of these two training approaches are the following: In the Activity training approach the focus is on individual training requirements. Here the trainee and/or the line supervisor subjectively identify individual training requirements (training needs). Furthermore, this approach has no conclusive form of evaluation being conducted, especially to determine whether the knowledge and skills gained during the training course has been transferred to the trainee's working environment.

Impact training focuses on results-orientated training aimed at meeting the needs of the organisation by providing employees with relevant knowledge and skills to improve their performance. The work environment is seen as an extension of the training programme enabling both the Human Resources Department (Training and Development Department) and the line manager to work in joint collaboration when measuring the trainees' performance in a practical environment.

A self-designed questionnaire was used to determine whether the selected sample population (n=171) follows an Activity or an Impact training approach when implementing a Total Quality Management strategy.

The research revealed three pertinent findings: Firstly, Total Quality Management programmes implemented within the South African food manufacturing industry characterise both the Activity and the Impact training approaches.

Secondly, the Impact training approach makes a greater contribution towards the successful implementation of a Total Quality Management programme and thirdly, that no relationship exists between the Activity and the Impact training approaches as these two training approaches have their own strengths and weaknesses, which contribute to the Total Quality Management strategy differently.

In addition, the research revealed that if an organisation wants to pursue a successful Total Quality Management programme, the following should be considered: Firstly, Quality Circles should be used to prepare the groundwork for implementing Total Quality Management training programmes. Secondly, feedback should be used as an important feature when implementing these Total Quality Management programmes. Thirdly, the needs analysis phase of a training programme should be conducted very thoroughly to obtain as much information as possible about the training needs of both employees and the organisation. Fourthly, levels two, three and four of Kirkpatrick's evaluation model should be conducted in a continuum, and a collaborative approach needs to be followed by the line manager and the trainer when implementing all four phases of the Total Quality Management training programmes.

What has become evident from the research is that Total Quality Management training programmes require a joint-effort from the learner/trainee, the trainer/Training and Development Department, and the line manager. The Impact training approach bears out these characteristics, which are evident in the research. In comparison the Activity training approach is a useful methodology for the trainer who has to conduct training programmes in a work environment where he/she gets very little support, but is still expected, none the less, to deliver training programmes. While attempting to find an approach that works better, many organisations are still using the characteristics that are pertinent to both the Activity and Impact training approaches, which have been amplified in this research and the literature reviewed.

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LIST OF ABBREVIATIONS

CSS:	Central Statistical Services
FAO:	Food and Agriculture Organisation
GDP:	Gross Domestic Product
HR:	Human Resources
HSRC:	Human Science Research Council
JIT:	Job-instructional training
JIT production:	Just-in-Time production
OTJ training:	On-the-job training
QC's:	Quality Circles
QFD:	Quality Function Deployment
SPSS:	Statistical Package for the Social Sciences
TQM:	Total Quality Management
WCR:	World Competitiveness Report

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GLOSSARY OF TERMS

Activity Training: Activity training is an approach that focuses on individual training requirements. These individual training requirements (training needs) are subjectively identified by the trainee and/or the line supervisor. Furthermore, in this approach there is no conclusive form of evaluation conducted, especially to determine whether the knowledge and skills gained during the training course have been transferred to the trainee's working environment. The basic form of evaluation that might be conducted in this training approach does not include the participation from the recipient or the line supervisor.

Evaluation: The systematic collection of descriptive and judgmental information necessary to make effective decisions related to the selection, adoption, value, and modifications of various instructional activities.

Impact Training: Impact training focuses on results-orientated training aimed at meeting the needs of the organisation by providing employees with relevant knowledge and skills to improve their performance. The work environment is seen as an extension of the training programme in the Impact approach enabling both the Human Resource department and the line manager to work in joint collaboration when measuring the trainees' performance in the work environment. The Impact training approach aims to provide feasible and cost-effective training programmes that are relevant to the needs of the organisation, its employees and line supervisors/managers.

Needs analysis: The detailed investigation of an apparent performance problem to establish real causes or needs, which can be addressed by training programmes.

Quality: Quality is based upon the customer's actual experience with a product/service, measured against his or her requirements – stated or unstated, conscious or merely sensed, technically

operational or entirely subjective – to determine whether the quality of the product/service provided coincides with the price thereof.

Quality Circles: A work group of employees (usually five to ten members), who meet regularly to discuss their quality problems, investigate possible causes, recommend solutions, and take corrective actions to improve productivity and strengthen quality initiatives in the organisation as a whole.

Total Quality Management: There are several definitions for this term, but at its heart is a set of management practices designed to continuously improve the performance of organisational processes to profitably satisfy customers. It is founded on the understanding that organisations are systems with processes that have the purpose of serving customers. TQM calls for the integration of all organisational activities to achieve this goal.

Trainer: A Human Resources Development professional, either internal or external to the organisation, who analyses performance problems and designs, delivers,

evaluates, manages, and/or supports training in a variety of ways.

Training: A planned process to modify attitude, knowledge or skill behaviour through learning experience to achieve effective performance in an activity or range of activities. Its purpose, in the work situation, is to develop the abilities of the individual and to satisfy the current and future needs of the organisation.

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CHAPTER ONE

OVERVIEW OF STUDY

1.1 INTRODUCTION

In a rapidly changing environment, unprecedented pressure is being placed on every organisation to maintain its competitive position, due to finite resources and new technology (Hickman and Silva, 1984: xiii; Land and Jarman, 1992; Juechter, 1993). Many organisations, especially those in developing economies, have begun to re-examine and redraft the structure of their competitive strategies (Lowenthal, 1994; Prior, 1994: 3-4). Munro-Faure and Bones (1993:xiii) and Patel and Randell (1994) regard the need for such a step to be crucial, because in today's highly competitive marketplace, many organisations offer broadly the same range of products or services. Therefore, the primary differentiating factor in the eyes of the customer is frequently the quality of the total product and/or service rendered.

Hence, to improve the quality of products and/or services, a number of quality-improvement programmes have been adopted by organisations over the last two decades and these include: TQM (Total Quality Management), JIT (Just-in-Time) production, QFD (Quality Function Deployment), zero-defects, benchmarking, the team approach, and QC's (Quality Circles) (Hayes and Pisano, 1994).

The earliest quality implementation model, which was applied throughout all departments in an organisation, was the Japanese "Quality Circles" concept (hereafter referred to as QC's). QC's emphasised the use of problem-solving teams in an organisation to detect, address and solve quality problems (Creech, 1995:47-48). Hutchins (1985:3) hailed QC's as being the most inspiring approach to management since the advent of the scientific management theory, because of the encouragement of employee-participation in addressing quality problems.

However, the acclaimed Japanese author, Imasaaki Imai (1986:32) considers QC's as having failed in the West. Many possible reasons have been cited for the failure of QC's in Western organisations, but Mahoney and Thor (1994:48-50) and Drummond (1992:127) perceive mismanagement of resources, especially human resources, to be the primary reason. The authors further assert that QC's failed because they were mechanisms of development which organisations used to enhance their goals, but chose neither to develop the people nor the organisational structure to sustain them. In the light of the perceived failure of QC's, Western organisations decided to explore the Total Quality Management route (hereafter referred to as TQM), as this was viewed as a more holistic approach to quality management than the implementation of QC's.

In Sashkin and Kiser (1993:39), W. Edwards Deming defines TQM as follows: "Total Quality Management means that the organisation's culture is defined by and supports the constant attainment of customer satisfaction through an integrated system of tools, techniques, and training. This involves the continuous improvement of organisational processes, resulting in high quality products and services." It can therefore be deduced that for TQM to be effective

as a quality improvement process, every element within an organisation ought to be effected by such a quality improvement (Webb, 1991:69; La Motta, 1995:57).

Despite these changes implemented by Western organisations in an attempt to overcome quality failures and problems experienced, various authors have expressed their concern that TQM programmes are following the same cul-de-sac as QC's. (See Bossink, Gieskes and Pas, 1992; Shani, Mitki, Krishnan and Grant, 1994; Hubiak and O'Donnell, 1996.)

As was the case with QC's, many have aspired to identify the possible causes for the lack of results experienced in TQM programmes. Creech (1995:48) is of the opinion that employees are the real test of whether a quality-programme has really succeeded or not. Yet, the importance of the human element was under-emphasised in the operation of QC-programmes. Several sources indicate that TQM-programmes followed suit and failed to go the distance, because the implementation strategies focussed on the short-term demands of the organisation, while overlooking the long-term needs of the workforce (Armstrong, 1987; Hopkins, Nestleroth and Bolick, 1991:ix, 11, 13; Stewart, 1994:65).

Although numerous adages declare that people are the key to all successful business operations and that employers are increasingly depending on the skills of all employees for improvement in efficiency, effectiveness, quality, and customer service (Gerber, Nel and Van Dyk, 1992:1,15,29; Harrison, 1993:27), management is still taking the human element for granted. Organisations are quick to express their concerns for the planning, co-ordinating and control of the quality procedures, techniques and devices, but tend to overlook the people who ultimately operate within the quality framework.

Jeffries, Reynolds and Evans (1996:28-30) state that not only is the recognition of the human element important, but an essential part of the development of a TQM programme should be an extensive education and training programme for the workforce. Professor Kaoru Ishikawa, the Japanese quality guru, remarked that "Total Quality begins and ends with training" (Lorriman and Kenyo, 1994:106). Other authors in the field of quality management are in agreement with Professor Ishikawa's observations (see Deming, 1988:15; Juran, 1992:261-263; Webb, 1991:19; Buckley and Caple, 1992:20-21).

However, Broad and Newstrom (1992:15) are of the view that although many organisations are initially committed to quality training, the bridge between the classroom and the functional area is never accomplished. Weihrich (1985:149-150) and Peters (1987:388) concur with Broad and Newstrom, and emphasise the importance of integrating training with the TQM strategy, as well as the direction and vision of the company to identify the skills and behaviour that people need to enable them to be self-empowering.

In practice these assertions have been limited in terms of demonstrating the role that the Training and Development department, and especially the training practitioner, has to play to create the desired state of equilibrium between TQM and human development (Rossett and Krumdieck, 1992). Consequently, McCormack (1992) notes that the return on training investments rarely justifies its expenditure, resulting in training, and ultimately TQM, not being able to deliver the desired, and often long awaited, expectations.

Despite a notable increase of studies into TQM (Eshennawy, 1991; Dotchen and Oakland, 1992; Black and Porter, 1995; Oakland and Beardmore, 1995; Miros and Dale, 1996), there

is still no clear consensus as to what contribution training and development can make to ensure the successful implementation of TQM, nor whether a systematic and integrated training approach or a randomly applied training approach is most effective for the successful implementation of a TQM programme. This research investigates these problems and attempts to provide insight into the concerns that have been expressed.

1.2 OBJECTIVES OF THE STUDY

This study aims to:

- Investigate the role of training and development in a TQM programme.
- Establish the training approach that is followed in the selected industry.
- Determine the relationship between the type of training pursued in an organisation and the successful implementation of a TQM programme.

1.3 THE FEASIBILITY OF THE STUDY

The study on the role of training and development in a TQM programme is feasible because:

- The issue of quality is essential to South African organisations in the light of international competition.

- The questionnaires submitted to the organisations were cost-effective and required the minimal amount of time to be completed.

- The chosen industry is of a varied nature and a representative sample would be easily attained.

1.4 STATEMENT OF THE PROBLEM

The purpose of this investigation is to establish the relationship between Activity and Impact training in selected South African food manufacturing companies, with reference to Human Resources support service programmes, in order to establish how training for specific purposes relates to TQM in companies operating in a dynamic business environment.

1.4.1 THE FIRST SUB-PROBLEM: THE CONTRIBUTION OF ACTIVITY TRAINING TO TOTAL QUALITY MANAGEMENT

The first sub-problem is to evaluate Activity training with reference to Human Resources support service programmes in order to determine the contribution of cause-orientated training to the overall TQM goals and objectives of an organisation.

1.4.2 THE SECOND SUB-PROBLEM: THE CONTRIBUTION OF IMPACT TRAINING TO TOTAL QUALITY MANAGEMENT

The second sub-problem is to evaluate Impact training with reference to Human Resources support service programmes, in order to determine the significant contribution of results-orientated training to the extensive business needs of an organisation implementing TQM.

1.4.3 THE THIRD SUB-PROBLEM: THE RELATIONSHIP BETWEEN ACTIVITY AND IMPACT TRAINING

The third sub-problem is to integrate the findings of cause-orientated training and results-orientated training, in order to evaluate the effects of a training strategy focussing on training for specific purposes and its impact of the implementation of TQM.

1.5 CONCEPTUAL CLARIFICATION

The following clarifications of Activity and Impact training are based on the explanations depicted thereof in Robinson and Robinson (1989).

1.5.1 ACTIVITY TRAINING

Activity training is an approach that focuses on individual training requirements. These individual training requirements (training needs), are subjectively identified by the trainee and/or the line supervisor. Furthermore, in this approach there is no conclusive form of

evaluation conducted, especially to determine whether the knowledge and skills gained during the training course have been transferred to the trainee's working environment. The basic form of evaluation that might be conducted in this training approach does not include the participation from the recipient or the line supervisor.

1.5.2 IMPACT TRAINING

Impact training focuses on results-orientated training aiming to meet the needs of the organisation by providing employees with relevant knowledge and skills to improve their performance. The work environment is seen as an extension of the training programme enabling both the Human Resource Department and the line manager to work in joint collaboration when measuring the trainees' performances in a practical environment. Ultimately, the Impact training approach aims to provide feasible and cost-effective training programmes that are relevant to the needs of all stakeholders.

1.6 DELIMITATIONS

The investigation is limited to the South African food manufacturing industry. The internal analysis focuses on the in-house training strategies and activities of selected companies following TQM. Evaluation is not conducted on the contribution of specific internal training programs, for example JIT (job-instructional-training), nor specific external training programs utilised by the selected organisations to ensure TQM. The study will not attempt to distinguish between the various types of products manufactured by the selected

organisations and how training and development relates to these products in terms of external customer satisfaction.

1.7 UNDERLYING ASSUMPTIONS

It is assumed that:

- The Impact training approach, as depicted by the two American authors Robinson and Robinson (1989), pertains to the South African business environment.

- The Impact training approach makes a direct contribution to the successful implementation of a TQM programme.

- The contribution from the selected South African food manufacturing companies will be in a positive and constructive manner.

- The participants' perceptions regarding the role of training and development in the successful implementation of TQM within their respective organisations, could be determined by means of questionnaires and statistical analysis.

1.8 MOTIVATION FOR THE PROPOSED RESEARCH

South Africa's entry into the 1990s was dramatic. An historic election led to a decisive change of course for the nation. The watershed of occurrences has had a profound impact on the South African economy. Consequently new demands are placed on organisations, especially in the light of global market changes, increased international competition with the entry of the Eastern European block and the former Soviet Union to world markets, and demands for improved quality products and services.

In recent years there has been a world-wide trend towards quality products and services, as it enables organisations, as well as countries, to obtain, and sustain a competitive advantage by means of decreasing costs, increasing productivity, while emphasising customer satisfaction.

In the past two decades South Africa has been plagued by several problems on its economic forefront, of which low productivity figures has been the primary constraining factor for economic growth (Verslag van die Kommittee van Ekonomiese Aangeleenthede, 1989:263).

Economic growth and development is directly linked to the quality of a country's labour force. South Africa's education system has not been able to equip all citizens with the basic knowledge and skills required for functioning efficiently and effectively in the working environment. As a result only 15 percent of the South African workforce is considered to be

sufficiently skilled, while 52 percent are regarded as being semi-skilled (Gerber, Nel and Van Dyk, 1997:423).

In an attempt to increase productivity levels and decrease the skills-deficiency levels, numerous South African companies have embarked on the TQM path since the country's re-entry into international markets. South African organisations have sent a multitude of people on hundreds of quality-related seminars and courses over the last few years. In spite of these often time-consuming and costly interventions, there is growing concern that neither organisations, nor the country, are obtaining all the potential benefits from its training and development investments.

In 1994 South Africa's total training expenditure was approximately R670 million (Bowmaker-Falconer and Horwitz, 1994).[1] Despite these bold attempts to create the human capital needed for national growth, South Africa's productivity growth rate has remained very low for the past two years (Editors Incorporated, 1996:114;119).[2] The country's inclusion in the **World Competitiveness Report** (WCR) since 1992, indicates that South Africa is still languishing in the bottom third of the newly industrialising nations (Tonkin and Alfred, 1994; Productivity SA, 1997).[3] Evidently, there is a gap between the relevance of the training and development programmes pursued in South Africa and the ability thereof to address employees' needs.

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1 Refer to Appendix A.
2 Refer to Appendix B.
3 Refer to Appendices C and D.

Training that is offered sporadically on a re-active basis, would neither be able to meet the needs of the workforce, nor that of the organisation. However, when training is offered on a continuous basis and is directly related to the needs of the employees in facilitating the attainment of the relevant knowledge and skills to their tasks and duties, the perceived role of the trainer will change, from that of a fire-fighter to a pro-active participant and stakeholder in ensuring the success of the organisation's quality programme. Only under these circumstances will the outcomes of the training intervention justify its expenditure. Hence, management and employees would perceive the training and development department in a more favourable light, and not as a peripheral human resources function, but a cost-effective contributor that makes a direct impact on the employees' abilities to meet the organisation's quality objectives.

It needs to be established whether organisations functioning in a TQM mode, are following an Activity or an Impact training approach, because South African organisations can no longer afford to spend money on a "hit-or-miss" basis. TQM embodies the philosophy of doing things right, first time, and this phrase must be made applicable to the training function as well, in order for South African organisations to move towards establishing a quality culture based on continuous learning and development in the light of ever-changing environmental influences.

Therefore, the purpose of this investigation is to establish the relationship between Activity and Impact training in selective South African food manufacturing companies, with reference to Human Resources support service programmes, in order to establish how

training for specific purposes relates to TQM in companies operating in a dynamic business environment.

1.9 OVERVIEW OF CHAPTERS

The overview of the study is followed by the literature review, which describes the Activity and Impact training approaches. Chapter three covers the research methodology used, which is followed by the results and findings in Chapter four. The latter is followed by a discussion pertaining to the results, and the recommendations are stated in Chapter six.

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CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

This section provides a systematic outline of the characteristics of the Activity and Impact training approaches, and identifies how each of these training approaches manifests itself in the training process to ensure that the training programmes offered in organisations meet the quality expectations of all stakeholders.

This is followed by an overview of the quality movement with emphasis on the TQM philosophy and whether an Activity or an Impact approach to training makes the greatest contribution to the implementation of TQM programmes in selected South African food manufacturing companies. In conclusion a brief overview of the latter is provided, identifying the contribution of the food industry to the South African economy and the importance of training and development within the industry.

2.2 ACTIVITY AND IMPACT TRAINING

In this section the respective characteristics of the Activity and Impact training approaches are identified and described.

2.2.1 ACTIVITY TRAINING

The conceptual clarification and characteristics of the Activity training approach now follows:

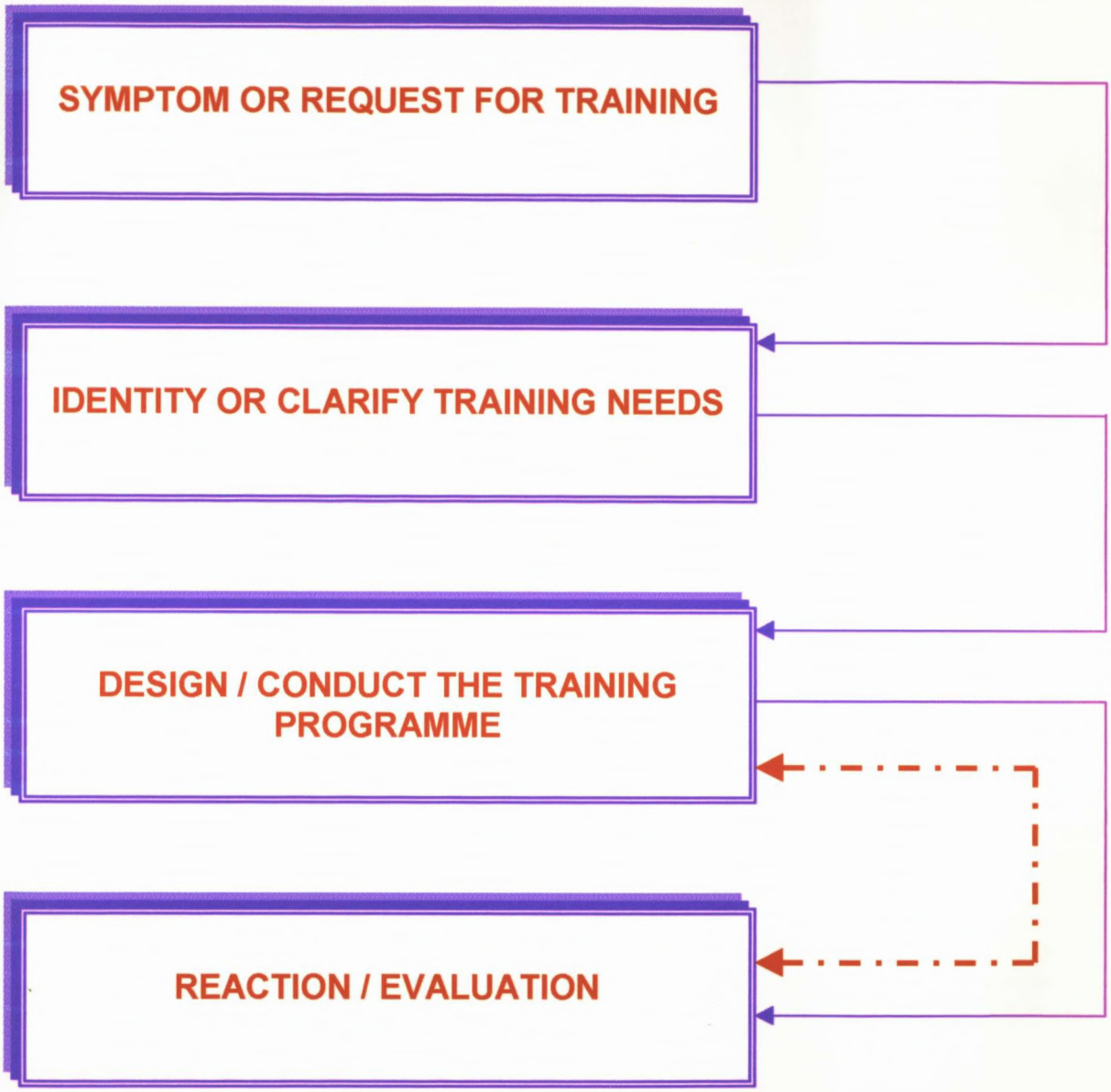
2.2.1.1 THE CONCEPTUAL CLARIFICATION OF THE ACTIVITY TRAINING APPROACH

Activity training is an approach that focuses on individual training requirements (refer to **FIGURE 2-1**). These individual training requirements (training needs) are subjectively identified by the trainee and/or the line supervisor. Furthermore, in this approach there is no conclusive form of evaluation conducted, especially to determine whether the knowledge and skills gained during the training course have been transferred to the trainee's working environment. The basic form of evaluation that might be conducted in this training approach does not include the participation from the recipient or the line supervisor.

2.2.1.2 THE CHARACTERISTICS OF THE ACTIVITY TRAINING APPROACH

The following five characteristics prevails in the Activity training approach:

FIGURE 2-1: THE ACTIVITY TRAINING APPROACH



Source: D.G. Robinson and J.C. Robinson, 1989. *Training for Impact: How to Link Training to Business Needs and Measure the Results*. San Francisco: Jossey-Bass Publishers, p.5.

2.2.1.2. (a) THE HUMAN RESOURCE DEVELOPMENT DEPARTMENT (TRAINING) IS RESPONSIBLE FOR TRAINING AND DEVELOPMENT, BUT NOT FOR THE RESULTS OBTAINED

A significant characteristic of the Activity training approach is that the Human Resources Development Department, while responsible for training and development, is not totally accountable for the results obtained from presenting a training and development programme. This means that in the typical training cycle the Human Resources Department/Training and Development Department takes the responsibility for the total number of programmes presented annually, the attendance figures for each programme, as well as the budgeting and expenditure for such programmes. However, in the Activity training approach the Human Resources Department does not fulfil all the obligations in the training cycle satisfactorily, for example, the evaluation of the effectiveness of the training programme is an integral part of the training cycle, but in this approach it tends to be ignored. Because of the evaluation phase being ignored, very little information on the cost-effectiveness and the overall contribution of the training programme to the organisation are provided to the line manager and/or top management.

In the South African context, Visser (1995) reveals the need for Human Resources Departments to become accountable and responsible for both the implementation and evaluation phases of training programmes. Visser expresses his concern that although South African organisations spend enormous amounts on training and development, companies are unable to justify their expenses and provide relevant data on the contribution of the training programmes to the organisation.

The Human Resources function can no longer afford to shift the responsibility of training and development onto other corporate departments. In future, corporate accountability for the development of an organisation's employees will have to be shared by both the Human Resources management function and top management. Hence, a participative and holistic approach to training and development is required to address the problems that organisations are facing in developing their human resources amidst international competition.

2.2.1.2. (b) THE HUMAN RESOURCE DEVELOPMENT STAFF ARE ACCOUNTABLE FOR THE DESIGN AND DELIVERY OF TRAINING PROGRAMMES

If an "Activity training approach" is followed, then the trainers are held solely accountable for the number of programmes delivered or designed. It therefore follows that the accent in the Activity training approach is on the presentation of training courses, rather than considering all the elements in the training cycle, for example, needs analysis and evaluation.

There are numerous models available to guide training professionals in instructional design (Nadler, 1982:9; Phillips, 1991:118-127; Gouch, 1996:26-30). Rothwell (1996:8-9) has found that in many instances, training is not directed in an organised manner. Reasons for this amongst other things is that training and development practitioners have not been instructed themselves on effective ways to design and direct instruction. Sometimes training and development professionals are given such short notice to deliver training courses that they have no time to carry out instructional design systematically, thus relinquishing

effectiveness for speed. Consequently, the training programme is viewed as merely another activity within the Training and Development Department.

Barham and Rassam (1989:123) recognised similar characteristics to those identified by Rothwell, in, what they termed to be a fragmented approach to training, because "under this approach, training is regarded as a peripheral activity for the organisation. Training is seen as a very separate functional activity, managed exclusively by training professionals."

Robinson and Robinson (1989:6-7) agree with Barham and Rassam (1989:124) that training is highly directive under these circumstances. The time that has elapsed since employees last attended a training course acts as a guideline to determine their future attendance and not their actual training needs or those of the organisation. Needs analysis no longer forms the starting point for resolving performance problems. The role of the trainer and the training department is seen as a delivery agent to overcome organisational problems and fails to link organisational goals and training efforts (Bassi and Cheney, 1997). In addition, Rothwell (1996:5-6) states that, because training and development lacks focus, the accountability and responsibility to ensure effective and efficient training is passed on from the Training Department/Human Resources Department to the line managers/supervisors in other departments. As a result the role that training and development has to play in the organisation, it is not always clear and frequently lacks uniformity resulting in a lack of impact.

2.2.1.2. (c) THE ABSENCE OF SKILL TRANSFER FROM THE CLASSROOM TO THE JOB

The end-of-course reaction evaluation is often the only form of evaluation conducted in the Activity training approach. While valuable information about the program is provided, such information does not collect data about the application of new skills and/or knowledge on the job (Robinson, et al, 1989:7).

Furthermore, the Human Resources Department seldom contemplates the implementation procedures that would guarantee a high percentage of skill transfer under this approach, because on-the-job application is perceived as the responsibility of the trainee and the line manager or supervisor (Francis, 1995:56). Barham and Rassam (1989:124-126) warn that such a fragmented approach to training focuses on transmitting chunks of information instead of instructing trainees into new innovative ways of performing their tasks and duties while developing specific skills. Laird (1985:145) has found that these conditions inhibit the transfer of training and as a result training comes to be regarded as a cost, and not a future investment for the organisation that constrains the impact of the training programmes offered.

2.2.1.2. (d) THE LACK OF ALIGNING THE TRAINING AND DEVELOPMENT GOALS WITH THE OVERALL BUSINESS NEEDS OF THE ORGANISATION

A common characteristic of the Activity training approach is unconnected training courses being offered, for example, "a needs analysis completed five years ago indicated that the

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course would be helpful, and now that course has a life of its own, or perhaps everyone in industry is conducting this program, and so it makes sense for the organisation to do likewise" (Robinson, et al, 1989:7).

Hence, training needs to be linked directly to a business problem, such as decreasing product demand or increased criticism from customers, or a new business venture. Rothwell (1996:11) is in agreement with Robinson et al (1989) and states that training is viewed as an isolated undertaking that is not linked to, or synthesised with, other organisational initiatives, such as corporate procedures, processes, compensation, or enhancement. Rothwell terms this approach as "sheep-dip training", in which the same training is delivered to everyone purposelessly to establish awareness. This approach has often been applied in TQM training. Hence, the costs and lack of direction overshadows the impact that training can make towards the organisation.

2.2.1.2. (e) THE LACK OF IDENTIFIED MANAGEMENT RESPONSIBILITIES FOR RESULTS

The line managers often express their expectations of how the trainees' newly acquired knowledge and skills will benefit the organisation. When training fails to live up to the anticipated outcomes the human resources practitioners are blamed. In the Activity training approach, the line manager does not share the responsibility for on-the-job application of the knowledge and skills gained during the training programme. Insufficient support from the line manager results in the importance of training and development being questioned

and leads to the Human Resources Department's inability to present results-orientated training programmes (Clark, 1996:20; Rothwell, 1996:6-7).

The impact training approach has been proposed to alleviate the shortcomings that have been identified by the Activity training approach. The Impact training approach combines the individual's learning experience, knowledge and skills with the working environment in order to ensure that the training provided is directly linked to the organisation's objectives. In the following section, a systematic overview of the Impact training approach is provided.

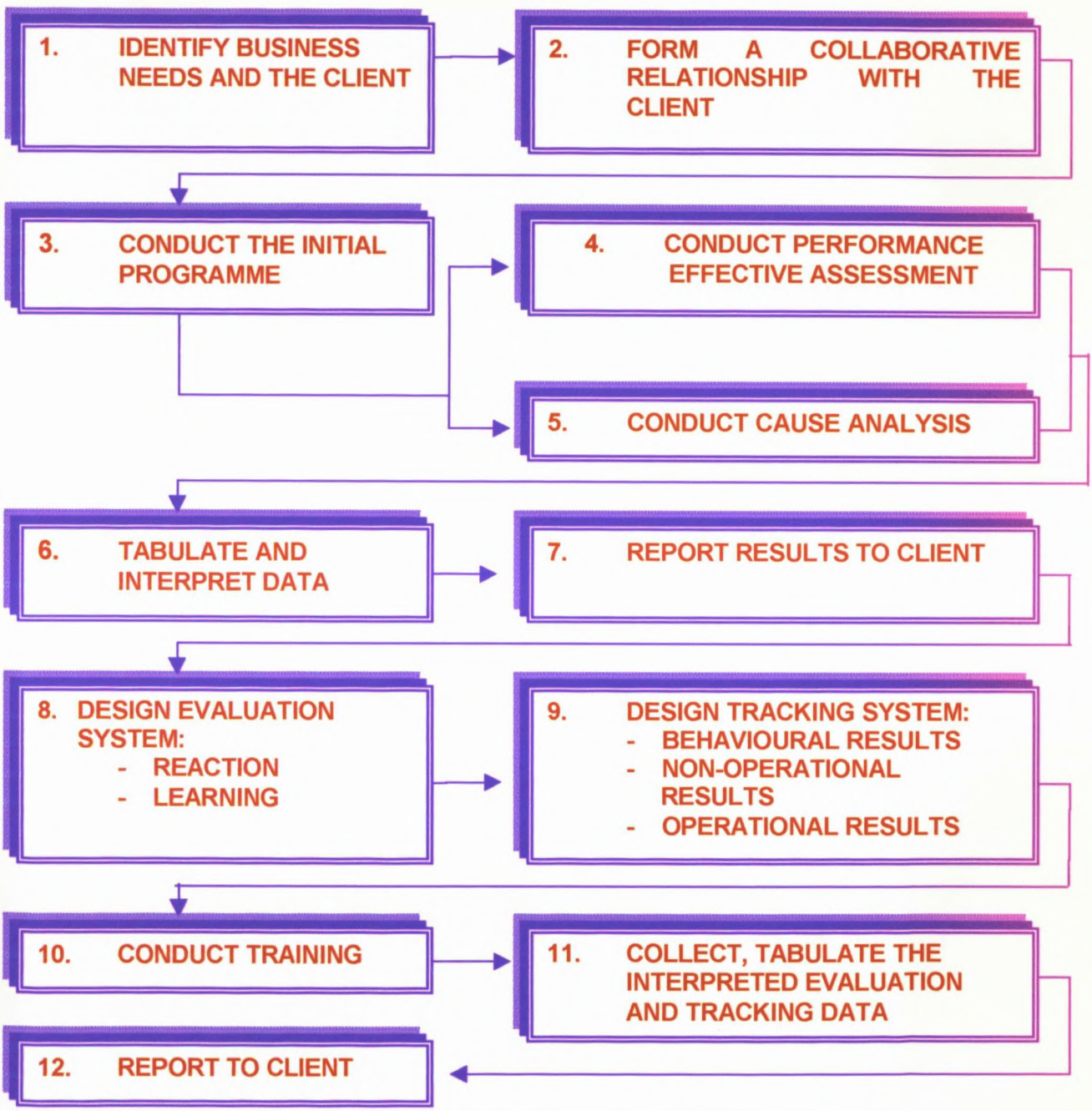
2.2.2 IMPACT TRAINING

The conceptual clarification and characteristics of the Impact training approach now follows:

2.2.2.1 THE CONCEPTUAL CLARIFICATION OF THE IMPACT TRAINING APPROACH

Impact training focuses on results-orientated training aiming to meet the needs of the organisation by providing employees with relevant knowledge and skills to improve their performance (refer to **FIGURE 2-2**). The work environment is seen as an extension of the training programme in the Impact approach enabling both the Human Resource Department and the line manager to work in joint collaboration when measuring the trainees' performances in a practical environment. Ultimately, the Impact training approach aims to provide feasible and cost-effective training programmes that are relevant to the needs of all stakeholders.

FIGURE 2-2 : THE IMPACT TRAINING APPROACH



Source: D.G. Robinson and J.C. Robinson, 1989. *Training for Impact: How to Link Training to Business Needs and Measure the Results*. San Francisco: Jossey-Bass Publishers, p.15.

2.2.2.2 THE CHARACTERISTICS OF IMPACT TRAINING

The following five characteristics relates to the Impact training approach:

2.2.2.2. (a) ESTABLISHING A PARTNERSHIP BETWEEN THE HUMAN RESOURCE STAFF AND THE CLIENT

An important characteristic of the Impact training approach stresses the need for an interdependent relationship between the Human Resources function and line management, since both parties can accomplish a great deal because of their similar interrelated goals. The Training and Development Department is offered the chance to defend its presence in organisational wide quality processes, and management has the opportunity to develop their staff in line with the organisational requirements. However, when mutual support and synergy are absent, there is a low probability that endeavours to educate and develop people, will be successfully transferred to the job. Consequently, the costs of training are then difficult to justify in the wake of organisational cutbacks resulting in the training department and developmental needs of employees being jeopardised in the process.

2.2.2.2. (b) TRAINING IS LINKED TO BUSINESS NEEDS

If Human Resources Development professionals want to be recognised as business associates, then training programmes delivered should be based on organisational needs, problems or business ventures, which will be recognised, understood and supported by

management. The Impact training approach recognises the need for training to be linked to business needs.

Wexley and Latham (1985:22-23) warn that if training is to be linked to business needs, the connection must be established early in the training process, to ensure that from the outset the training programmes offered will be needs-driven. It means that the human resources department must respond to needs as they arise. Hence, the importance of needs analysis is firmly entrenched in the Impact approach.

2.2.2.2. (c) ASSESSMENT OF PERFORMANCE EFFECTIVENESS

The Impact training approach emphasises the importance of evaluating the training programmes offered. The impact of the training intervention should be assessed, not only in terms of the contribution thereof to the organisation, but also the quality performance of the trainees. Therefore, training should not only be confined to the safe haven of the training centre, but should be applied when participants return to the work environment.

The need is also expressed for training measurement to switch from teacher-centred learning approach to participant-centred learning and evaluation (Shiundu and Omulando, 1992:187-189; Carl, 1995:121). Trainees should be able to identify their skill and knowledge deficiencies and the trainer should only take on a facilitative role to rectify the problems that exist and to reinforce the necessary behaviours required (Calitz, 1982:74; Oliva, 1988:444; Kelly, 1989:216-219).

2.2.2.2. (d) MEASUREMENTS OF RESULTS

Training should be cost-effective if it is to be viewed as having an impact on the organisation. Cost per participant should be calculated, and management should be offered the opportunity to determine whether anticipated benefits will be worth the investment. Data should be provided to management to assist them in determining whether the desired outcomes have occurred. Hence, it is necessary for the training and development department to conduct detailed analysis of the information gained after conducting training programmes to assist management to eradicate old learning habits (Cullen, Sawzin, Sisson and Swanson, 1985:217-220).

2.2.2.2. (e) PREPARATION OF THE WORK ENVIRONMENT TO SUPPORT TRAINING

Individual development is viewed as a continuous learning process in the Impact training approach. A supportive working environment is essential for the organisation to benefit from continuous learning, which has become a necessity for competitive strength (Nielsen, 1985:292-295; Camp, Blanchard and Huszczo, 1986:334).

Robinson, et al (1989:255-279) perceive that joint collaboration between the training specialist and the line manager will ensure that continuous learning will be achieved. As a result, management needs to avoid forming the perception that learning which takes place on-the-job, and learning which takes place elsewhere, are two separate activities (Evans, 1981:296-299; King and Roth, 1985:287; Van Dyk, Nel, Van Z Loedolff and Haasbroek,

1997:172). Hence, training within the organisation needs to be seen as a continuum as depicted in **FIGURE 2-3**. Impact training provides a linkage between the working environment and the training needs of the individual and the organisation.

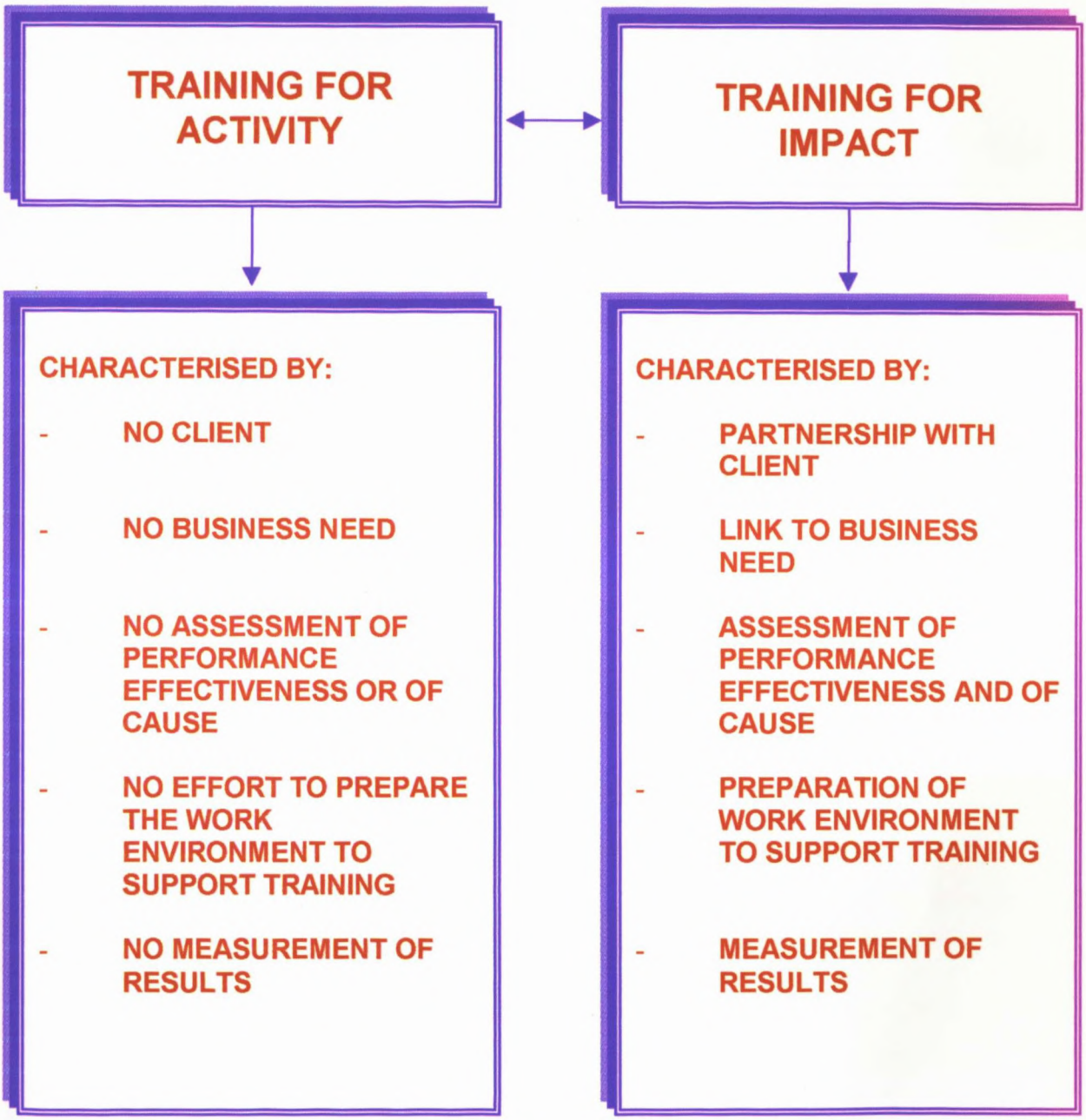
2.2.3 CONCLUDING REMARKS

Both the Activity and Impact training approaches allow the organisation to obtain results (see **FIGURE 2-4**). However, the Activity training approach is confined to the results obtained during a single training programme, but the Impact training approach is future oriented and caters for specific needs, while emphasising performance and demonstrating how training outcomes can contribute to the organisation achieving its quality expectations. Having identified the characteristics of the Activity and Impact training approaches, it is worthwhile elaborating on how these two approaches unfold themselves in the training methodology process in order to assist the organisation in implementing a TQM philosophy.

2.3 THE ROLE OF THE ACTIVITY AND IMPACT TRAINING APPROACHES DURING THE DIFFERENT PHASES OF A TRAINING PROGRAMME

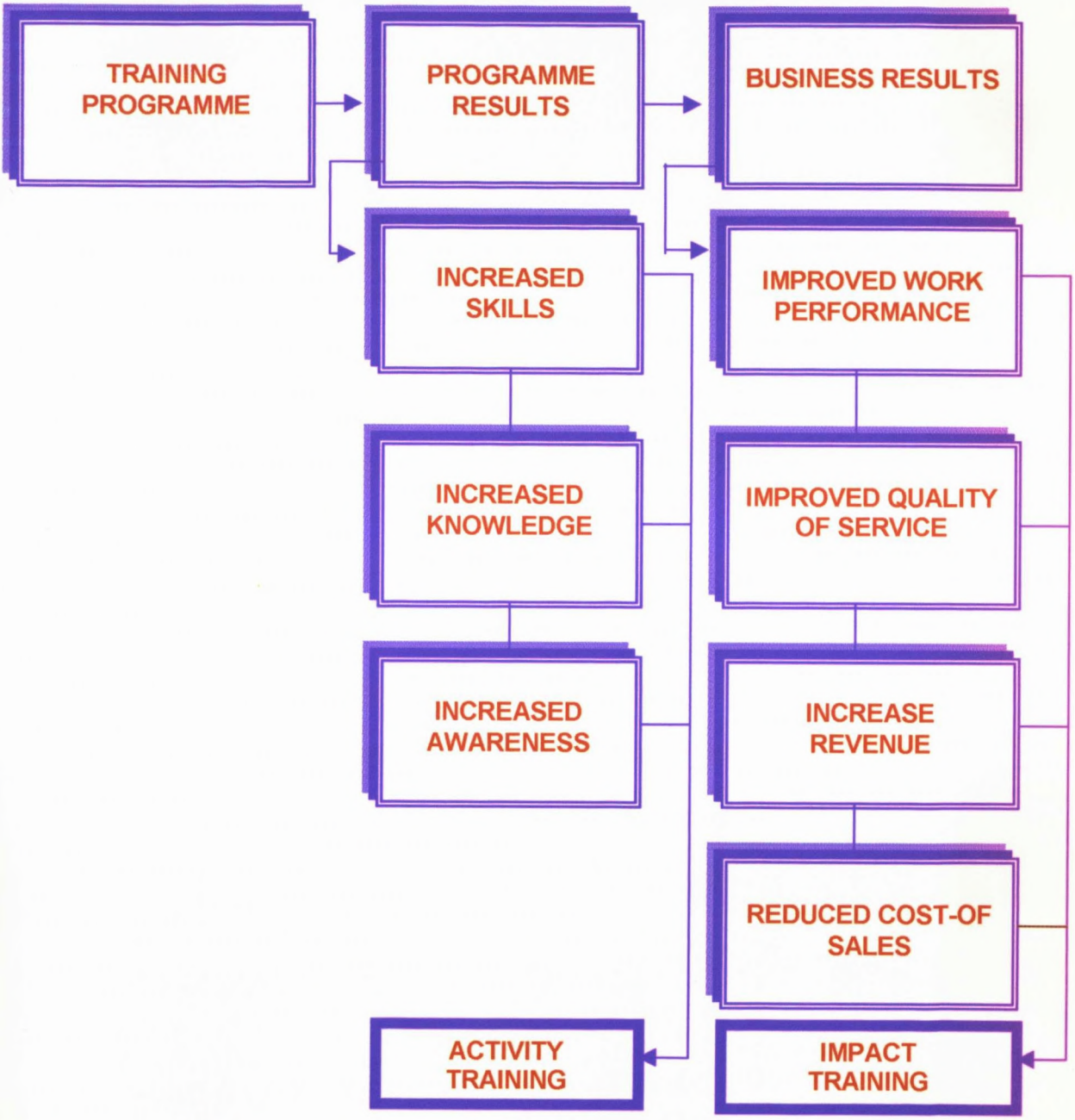
Essentially if training is going to influence the success of a TQM programme, then the following four phases are critical, namely: conducting a needs analysis, designing the training programme, the implementation thereof, and the evaluation phase. In the following sections each of these four training phases will be reviewed, to identify how the Activity and Impact training approaches manifest themselves in each phase to ensure the successful implementation of a TQM programme.

FIGURE 2-3: THE IMPACT AND ACTIVITY TRAINING CONTINUUM



Source: D.G. Robinson and J.C. Robinson, 1989. *Training for Impact: How to Link Training to Business Needs and Measure the Results*. San Francisco: Jossey-Bass Publishers, p.28.

FIGURE 2-4: RESULTS FROM ACTIVITY AND IMPACT TRAINING APPROACHES



Source: D.G. Robinson and J.C. Robinson, 1989. *Training for Impact: How to Link Training to Business Needs and Measure the Results*. San Francisco: Jossey-Bass Publishers, p.14.

2.3.1 THE FOUR TRAINING PHASES

An overview of the four training phases, namely needs analysis, design, implementation and evaluation now follows:

2.3.1.1 PHASE ONE: ESTABLISHING THE TRAINING NEEDS

A needs analysis is a "detailed investigation of an apparent performance problem in order to establish real causes or needs of the situation and to establish which of these may be addressed by training" (Van Dyk, et al, 1997:252).

The Impact training approach emphasises the importance of conducting a needs analysis prior to designing the training course. This view is reinforced by Oppenheimer (1985:45), Svenson and Rindered (1992:184) and Dalziel (1994:145-146) who propagate the need for a systematic needs analysis process enabling organisations to react swiftly and change behavioural problems into opportunities.

Similarly, MacKay (1989:173) states that the inability to precisely establish organisational and individual training needs with respect to TQM, have resulted in the ineffectiveness of such training programmes. London and Wueste (1992:188-190) observed that when such related training programmes are offered, training is then deemed as being developed in capsules, losing sight of the need for continuity in order for quality to be established in the organisation. Goodman, Bargatze and Grimm (1994) point out that training is then used as a quick-fix approach that can be contracted out. It is a means of avoiding the time and

exertion required for more sufficient, enduring strategies, such as empowerment, incentives and measurement procedure to aid the accomplishment of TQM.

Numerous models for undertaking training needs analysis are described in the literature (Gilbert, 1978:179; Michalak and Yager, 1979:10; Nadler, 1982:14; Zemke and Kramlinger, 1984:22; Camp, Blanchard and Huszco, 1986:4; Wolmarans and Eksteen, 1987:17). However, these models emphasise the procedural steps to follow when conducting a needs analysis exercise, but the importance of joint collaboration between the trainer and line manager is overlooked. Hence the training programmes often deliver disappointing results and fail to meet the expectations of the trainees, and management alike, while ultimately failing to contribute to the goals of the organisation in achieving the quality expectations envisaged by the implementation of TQM.

Consequently, Rothwell (1996:42-44) suggests a New Human Performance Enhancement Model (refer to **FIGURE 2-5**) to conduct a needs analysis exercise that would be in line with the demands placed on an organisation when implementing a TQM programme. According to Rothwell (1996) a needs analysis model should focus both outside the organisation (customers, suppliers, distributors, and other stakeholders) and inside (employees, line supervisors and management). Therefore, the need for a holistic approach to training needs analysis is expressed in a TQM environment, because quality of all procedures and processes are advocated, while meeting the needs of the customer, both internally and externally, in a cost-effective manner.

FIGURE 2-5: A MODEL FOR HUMAN PERFORMANCE ENHANCEMENT

Source: W.J. Rothwell, 1996. *Beyond Training and Development: State-of-the-Art Strategies for Enhancing Human Performance*. New York: Amacom, p. 43.

2.3.1.2 PHASE TWO: DESIGNING THE TRAINING PROGRAMME

Most designers who have studied training and instructional design have concluded that it is not technology that really determines the effectiveness of a training programme, but rather the soundness of the instructional design process (Nadler, 1982:9; Gouch, 1996:26-30).

The Impact training approach postulates that the design of a training programme could only be successful, if joint collaboration exists between the trainer and the line manager in planning and designing the training programme. Jones (1996:93-100) believes that the most important element in the design phase is the customer. In order for training programmes to be effective it should be designed to meet the needs of the trainees and the line manager, who will ultimately be expected to use the knowledge and skills gained from the training programme in the job situation (Buckley and Caple, 1992:30-32).

Concern has been expressed that the training design fails, due to a lack of understanding of the nature of the job and the performance of the people in it (This, 1985:78; Tyson and Fell, 1992:89). Sizemore House (1985:182-183) and Botes (1994:131-132) are of the opinion that the most relevant job-related information is obtainable from the line manager, who is constantly in contact with the employees and who are aware of the nature of their jobs. The importance of a co-operative relationship between the trainer and the line manager is also emphasised by Gordon (1994:10) and Shapiro (1995:217-218, 222-224). Both authors support a Total Quality Training Design approach to sustain the TQM training implemented in the organisation.

The major difference between the traditional training design models and that of Gordon (see **FIGURE 2-6**) and Shapiro (see **FIGURE 2-7**) lies in the evaluation of the design process. Instructional design models usually consist of a front-end needs analysis procedure, a design and development stage, and a final system evaluation phase, whereas the proposed models of Gordon and Shapiro include user-based evaluations during the design process, and not only at the end. Hence, in these models it is still possible to make actual modifications to the programme, before incurring considerable development costs.

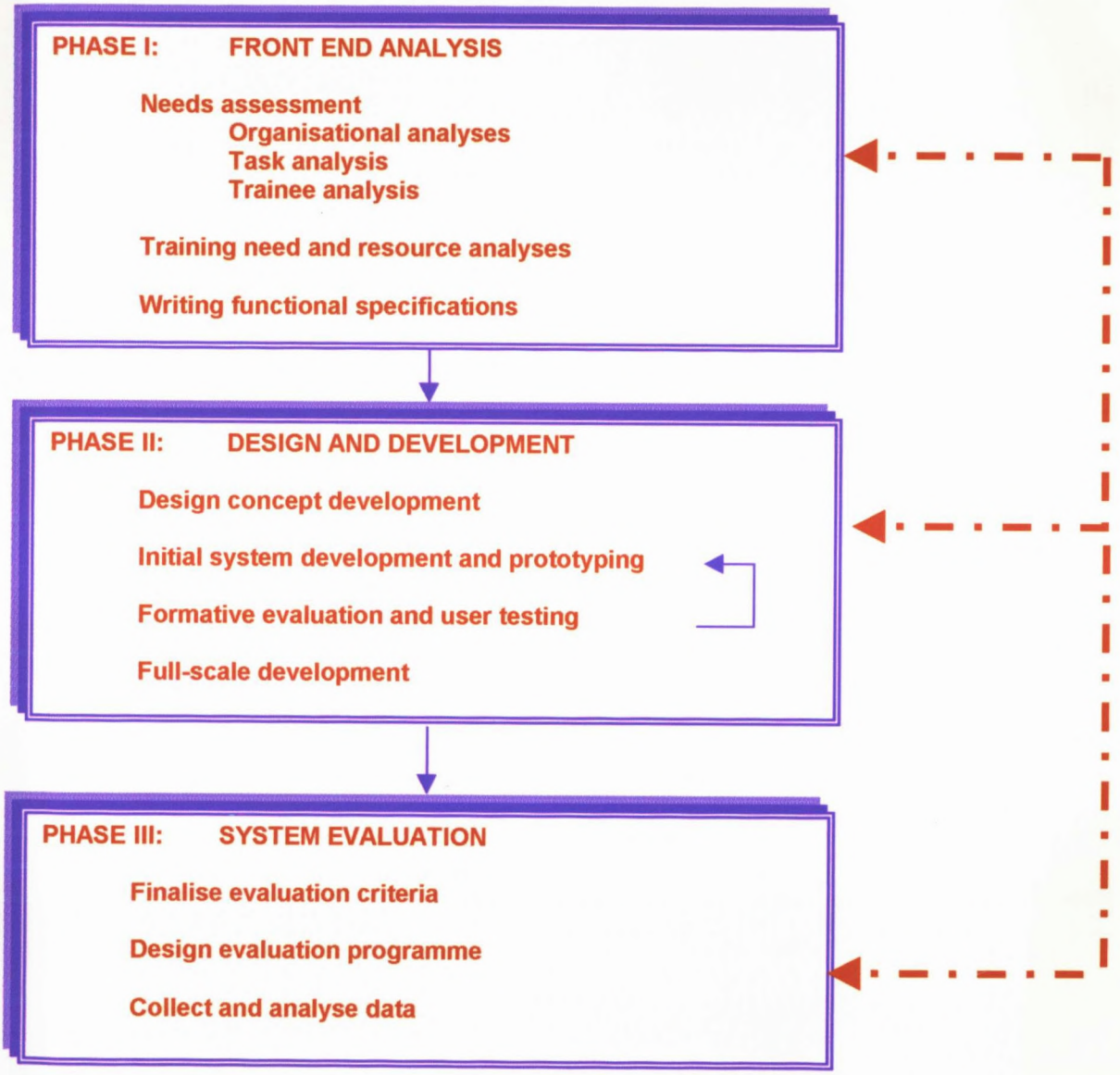
Mercer (1989:220-221) and Cascio (1991:35-38) are of the opinion that if the design of a training course can contribute directly to the needs of the organisation and is conducted in a cost-effective manner, management would most likely be more inclined to sustain the TQM training effort.

Therefore, a cost-effective training design, aimed at the needs of the user and directly linked to the quality objectives of the organisation, will enable the training specialist to make pro-active decisions on the training programme's content, before implementation, while enabling the training design to deliver the quality standards that are linked to the organisation's TQM expectations.

2.3.1.3 PHASE THREE: IMPLEMENTING THE TRAINING PROGRAMME

The presentation of a training programme is the pinnacle of the entire planning phase of a course and the effectiveness and efficiency thereof is a decisive factor in ensuring the success of the training intervention.

FIGURE 2-6: DESIGN MODEL FOR TRAINING AND PERFORMANCE SUPPORT SYSTEMS



Source: S.E. Gordon, 1994. *Systematic Training Programme Design: Maximizing Effectiveness and Minimizing Liability*. Englewood-Cliffs, New Jersey: Prentice-Hall, p.12.

FIGURE 2-7: TOTAL QUALITY TRAINING DESIGN

To achieve training effectiveness, the initiative should contain:

1. Learning objectives which describe the desired behaviours(s) to be exhibited during the training programme	4. Evaluation of student performance of the desired behaviour to determine competence during training
2. Evidence of a performance discrepancy in relation to the desired behaviour resulting from a lack of skill or knowledge	5. Evidence that the desired behaviour has persisted after training and is linked to results
3. Examples or models of the desired behaviour during the training programme	

Source: L.T. Shapiro, 1995. *Training Effectiveness Handbook: A High Results System for Design, Delivery, & Evaluation*. New York: McGraw Hill, p.218.

Extensive literature has been published on how to conduct an effective presentation and training programme (Tack, 1983; Abella, 1991:99-132; Rae, 1992:32-46; McArdle, 1993; Reay, 1994a), as well as the methods that could be used during the training course to facilitate the learning process (Beach, 1985:250-255; Hart, 1991:37-78; Anderson, 1993:121-138; Reay, 1994b; Frank, 1996; Rae, 1996:93-111; Stewart and McGoldrick, 1996:88-93).

Traditionally the trainer was regarded as the sole delivery agent of a training course (Laird, 1985:28-29; Broad and Newstrom, 1992:32-33). However, Jollies (1994) and Schneier, Russell, Beatty and Baird (1994:577) suggests that the implementation of the training course should be conducted by the training specialist and the line manager in joint collaboration, which corresponds with the characteristics of the Impact training approach.

Eliciting participation from line management in implementing the training programme will assist trainers in empowering line managers to accept change, which is a requirement in all TQM programmes (Beardwell and Holden, 1994: 350; Stewart, 1994:73-85). In addition, mutual respect, co-operation and communication between trainers and line managers increase the overall credibility of a TQM training programme which impacts on the bottom-line results of training in the organisation (Gryna, 1988:11.9; Dodson, 1991; Grace and Straub, 1991; Ferketish and Hayden, 1992; Sonnenfeld and Ingols, 1994:93).

Although the implementation of a training programme is often perceived to be the pinnacle of weeks, and even months of analysis, planning and design, the ultimate impact that has been achieved by a training programme, only becomes evident when evaluation is undertaken.

2.3.1.4 PHASE FOUR: EVALUATION

Evaluation concludes the training process and provides feedback on the effectiveness of the course. Bramley (1996:3) defines evaluation as follows: "evaluation is the systematic collection of descriptive and judgmental information necessary to make effective decisions related to the selection, adoption, value and modifications of various instructional activities".

The Impact training approach calls for continuous evaluation, during and after course implementation, to ensure that the course content, presentation and implementation of the training programme are in line with the overall TQM programme's expectations of the trainees and line management.

Other authors have also identified the benefits that may be derived from conducting an evaluation exercise. According to Diamond (1989:135) and Barnes (1992:161-168), evaluation provides feedback to the trainer and the trainee alike about the progress of the learner. In addition evaluation is a valuable source of data to improve the content of the programme and review the needs analysis process undertaken prior to conducting the TQM training course (Nadler, 1982:39; Murray, 1991:162-164; Johann, 1995:141).

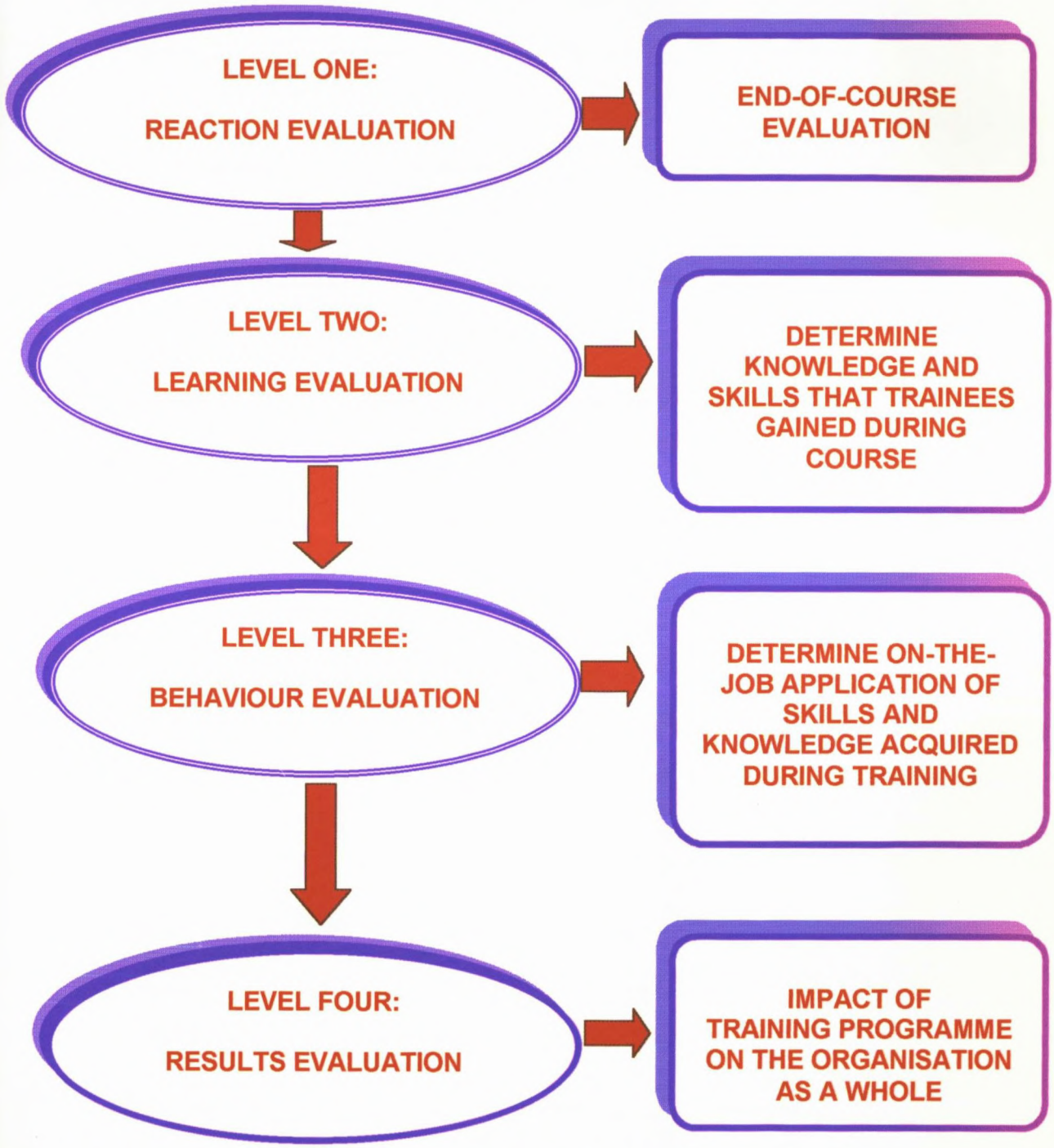
Despite the obvious advantages of evaluating a training programme, Mumford (1993:186-187) is of the opinion that evaluation is the most neglected area in training and concludes that failures to conduct evaluations are mainly due to four reasons:

- Failures to establish clear objectives and measures of attainment for the course.
- Lack of concern by line management, who fails to enforce the importance for trainers to provide clear statements of benefits achieved.
- Lack of interest amongst trainers, who are characteristically more interested in delivering the course than examining the outcomes.
- Actual complications in formulating appropriate analysis processes.

The first two problems identified by Mumford can be overcome by conducting a thorough needs analysis and encouraging active, continuous participation from line management in the design and implementation phases of the programme. Mumford perceives that the proper implementation of an evaluation model can solve the last two problems.

While numerous evaluation models exist, the model of Kirkpatrick (see **FIGURE 2-8**) is generally regarded as the most well known framework for classifying areas of evaluation (see Popham, 1974:122; Stufflebeam, 1974:121; Michaelis, Grunsman and Scott, 1975:153-154; Pratt, 1980:342-344; Steyn, 1982:106; Oliva, 1988:446; Broad and Newstrom, 1992:46; DuBois, 1993:231; Rothwell and Kazanas, 1995a:27-37).

FIGURE 2-8: KIRKPATRICK'S FOUR LEVELS OF EVALUATION



Source: Adapted from Broad and Newstrom, 1992, *Transfer of Training*.

Kirkpatrick (1992) identified four levels of evaluation, namely: reaction, learning, behaviour and results. Each of these four levels of evaluation warrants closer investigation, to identify the contribution thereof to the Impact training approach.

2.3.1.4 (a) REACTION EVALUATION

Reaction evaluation is undertaken to determine what the participants thought of the training programme, including the course content, course presenters, facilities and layout, and the instructional design (Phillips, 1991:44-45; Kirkpatrick, 1996:21, 27).

Various sources have identified that relevant information is obtainable from reaction evaluation to determine the success of the training programme (see Elkins, 1977; Connolly, 1983; Callahan, 1986:10; Krein and Weldon, 1994; Schendel, 1994). However, concern has been expressed that organisations rely too heavily on reaction evaluation to determine the overall success of their training interventions (Eitington, 1984:245; Jay, 1996:187; Shandler, 1996:94).

Phillips (1991:44) forewarns that in relying too heavily on reaction evaluation causes the training specialist to lose sight of the ultimate objective of any training intervention, namely changing the participants' behaviour. According to Harari (1995:59-60) the latter directly contributes to the failure of TQM programmes in that it focuses on minimum results. The quality of the training function and its contribution to the overall goals of the organisation can not be justified by presenting top management with a stack of "happy sheets". Therefore, while reaction evaluation is important, it needs to be undertaken in conjunction

with other forms of evaluation to prove the validity and reliability of the overall training evaluation exercise.

2.3.1.4 (b) LEARNING EVALUATION

Kirkpatrick (1996:22) defines learning evaluation as the extent to which participants modify their styles, gain understanding, and/or develop their skill-base as a result of attending the programme.

Learning needs to be demonstrated by a difference in behaviour, which should be determined by measuring the practical application of the knowledge and/or skills acquired (Singer and Ramsden, 1969:5; Alliger and Horowitz, 1989; Smith and Merchant, 1990; Tracey, 1992:456-460; DuBois, 1993:245; Betts, 1994:253).

The only manner, in which practical knowledge and skills can be measured successfully, is when the trainer and the line manager jointly participate in this evaluation phase. The Impact training approach identifies the importance of joint collaboration between the training specialist and the line manager to ensure that the acquired knowledge and skills are practised immediately. Other sources have also expressed the need for collaborative training, i.e. work-related, hands-on training, because such a learning process will ensure meaningful learning as opposed to rote learning (see Kolb, 1984:4-19; Cantor, 1988; Van Ments, 1990:11; Garavaglia, 1993; Gouch, 1996:26-29; Grabe and Grabe, 1996:47; Jones, 1996:96-97).

In order for a TQM programme to achieve the anticipated results, the learning experience of the trainees should be meaningful to ensure the transfer of knowledge and skills to the job environment. Therefore, learning evaluation and behaviour evaluation is interdependent and should be combined. This will allow the training department to establish a learning climate that is conducive to a TQM environment in that learning, and behavioural change, will be regarded as a continuum, which is an essential component of any TQM intervention.

2.3.1.4 (c) BEHAVIOUR EVALUATION

Behaviour evaluation allows the training specialist to verify whether the course objectives have been achieved (Rothwell and Kazanas, 1995a:34; Rothwell, 1996:287). In addition, behaviour evaluation allows the trainees the opportunity to transfer the knowledge and skills gained in the classroom to the working environment in an effective and continuous manner (Brethower, 1985:188; McCord, 1987:364; Garavaglia, 1993; Kirkpatrick, 1996:52).

Behaviour evaluation often takes on the form of on-the-job (OTJ) training in an attempt to make training relevant to the needs of the employees in that practical application is emphasised (Carnevale and Gainer, 1989:15; Jacobs and McGiffin, 1987; Ryan, 1991). However, although organisations allocate enormous amounts to OTJ-training, this form of training often fails to deliver the expected outcomes due to an unstructured approach, which is opposed to the principles of a TQM philosophy that requires an holistic approach and participation from all stakeholders (Rothwell and Kazanas, 1995b:242).

An unstructured approach is not only found in OTJ-training, but is generally a problem in many training approaches followed in organisations (Mosel, 1957:6; Hoffman, 1983; Baldwin and Ford, 1988:63). Broad and Newstrom (1992:7) conclude that approximately 40 percent of the knowledge and skills presented in training courses are transferred to the job immediately after training occurred, approximately 25 percent are still utilised after six months, and a mere 15 percent at the end of the year.

Parry (1994:33) argues that the problems related to an unstructured approach could be overcome by joint responsibility from both the training specialists and the line manager for the transfer of training. Joint responsibility can provide better results, the credibility of the training department will increase and training and development will be viewed as a value added to the organisation and not merely as a cost centre. Therefore, behaviour evaluation should not only be regarded as an activity conducted by the Training and Development Department or the line manager for the sake thereof, but as a means of justifying the importance of training and identifying the impact thereof on the quality of the organisation as a whole.

2.3.1.4 (d) RESULTS EVALUATION

Results evaluation constitutes the fourth level of Kirkpatrick's Evaluation model (1992) and **FIGURE 2-8** aims to link the outcomes of the training programme to the bottom line results of the organisation, which is consistent with Fitz-enz (1993:209), Harari (1995:62) and Hassett (1995:299-304), and is needed in order for the Training and Development Department to prove their worth to the organisation.

Several sources exist to guide training practitioners on how to conduct results evaluation and to determine the return on investment of the training programmes offered (Cullen, Sawzin, Sisson and Swanson, 1985:217-220; Laird, 1985:231-239; Phillips, 1991:224-230; Phillips, 1996a).

Despite the guidelines available on conducting results evaluation, the literature reviewed reports that organisations are reluctant to use results evaluation, because it is often perceived as the most difficult form of evaluation (Buckley and Caple, 1992:22; Krein and Weldon, 1994; Sonnenfeld and Ingols, 1994:91-92; Kirkpatrick, 1996:63-64; Shandler, 1996: 93-94; Bassi and Cheney, 1997).

In avoiding the use of results evaluation, the Training and Development function fails to deliver clear cut information on the return on investments that the organisation gains due to the training being offered (King and Roth, 1985:287; Metsen, 1985:292-298; Lookatch, 1991; Bernthal, 1995; Bennabou, 1996; Phillips, 1996a; Merrick, 1997). Consequently, the contribution of Training and Development practitioners to the bottom-line results of an organisation has become questionable.

The emphasis on bottom-line results in the organisation has identified the need for the Training and Development Departments to prove that a paradigm shift has occurred from conducting training programmes at random to a systematic, well-planned training intervention that focuses on achieving TQM objectives. The focus of the Training and Development Department should shift from the outcomes of single training programmes to that of a total service provided by the training function to the whole organisation (Bernthal,

1995; Chaddock, 1995). Hence, an holistic approach is required, as has been identified in the Impact training approach.

The efficient and effective use of results evaluation will enable the training practitioner to provide an holistic, ongoing quality service, emphasising the needs of the customer and proving the department's ability to run cost-effective programmes (Faidley, 1993; Huysamen, 1995).

2.3.2 CONCLUDING REMARKS

Training programmes that are offered in an unco-ordinated manner may be perceived as failing to contribute to the organisation's goals, in that re-actively designed training programmes are often associated with high costs, while failing to meet the needs of the organisation and its employees. Therefore, an Impact training approach tends to provide a greater contribution to the quality management programmes of an organisation by meeting the goals of the company and the needs of the employees. The Impact training approach makes a direct contribution to the successful implementation of a TQM programme. It is worth investigating the historical development of the quality movement to identify the variables that lead to the TQM philosophy of improving organisational performance by reducing costs, and simultaneously meeting customer needs.

2.4 TOTAL QUALITY MANAGEMENT

This section reviews the historical development of the quality movement and the inception of Total Quality Management in organisations.

2.4.1 THE HISTORICAL DEVELOPMENT OF THE QUALITY MOVEMENT

In today's competitive business environment, organisations are facing the formidable task to improve performances by constantly reviewing procedures and processes, reducing costs and increasing output. These changes mean going beyond the conventional management approaches and establishing a specific culture – an attitude towards continuous improvement with a focus on quality and customers.

During the Industrial Revolution of the 18th century, the craftsmanship of traditional quality was displaced by mass production (Lewis, 1994:4). Although the Industrial Revolution brought about scientific methods that transformed the manufacturing of goods, the consequence was poorer quality products (Loriaux, 1989:5; Lessem, 1991:3; Flood, 1993:6-7).

Frederick Taylor, the father of the scientific management approach, was acutely aware of the costs associated with poor quality and therefore emphasised the need to examine product quality as part of the production inspection (Capezio and Morehouse, 1995:ii-iii).

The emphasis on product inspection was pursued during the post-war period by the American consumer movement, but ironically one of the defeated nations, Japan, took the lead in the quality improvement contest (Tompkins, 1989:112-113). In the 1950s "Made in Japan" was *sine qua non* for inexpensive and inferior goods. Yet, by the 1970s, under the guidance of the Americans, W. Edward Deming and Joseph Juran, Japanese manufacturing grew to world-class levels of accomplishment (Chase and Aquilano, 1989:153-154).

W. Edward Deming is often regarded to be the father of the quality movement (see **APPENDIX E**) (Drummond, 1992:20-21; Berk and Berk, 1993:128-129; Silbiger, 1996:265-266). In the late 1940s Deming focussed on the concept of statistical quality control, which he had borrowed from Frederick Taylor, as well as the formulation of a systematic approach to problem-solving that became known as the PDCA-cycle (refer to **APPENDIX F**) (Price, 1990:15-18; Gingrich, 1995; Oakland and Followell, 1994:294). Deming's (1994) quality philosophy is depicted in his Fourteen Points (contained in **APPENDIX G**), which summarises his views on what a company must do to effect a possible transition from business-as-usual to world-class quality. Deming believed this quality shift could only be attained if a vigorous training programme was implemented (Goetsch and Davis, 1994:22).

Joseph M. Juran is often considered a co-founder of the 20th century quality movement (Kennedy, 1991:71). In the 1950s Juran (1993) focused on the methodology for determining avoidable and unavoidable costs of quality and specified the development of customer-orientated organisational systems as is depicted in **APPENDIX H** (Sashkin and Kiser, 1993:38). Juran suggested ten steps to quality improvement, of which point four

expresses the need to initiate training (see **APPENDIX I**) (Goetsch, et al, 1994:25). A distinctive feature of Juran's approach is his emphasis on team and project work, which illustrates the importance of non-technical aspects (the human element, communications, and management) to be crucial for quality control (Bowman, 1987:40-42; Schultz, 1994:60-62).

The Japanese quality gurus, Kaoru Ishikawa, Genichi Taguchi and Shigeo Shingo, modified Deming's and Juran's quality approaches. However, a major change in the Japanese quality philosophy was the emphasis on continuous development of quality processes, which became known collectively as the Kaizen approach (Sekine and Arai, 1992; Cortada and Woods, 1995:197).

The quality processes that Japanese organisations embarked upon made Japanese companies leaders in the manufacturing field. Yet, for decades Western businesses held on to the assumption that Japanese companies were essentially price competitive rather than quality competitive.

By the mid 1980s it became apparent to Western organisations that direct links exist between quality and the steady economic growth experienced in Japan since the end of the 1960s (Skinner and Ivancevich, 1992:20-28). Consequently, an escalating number of Western organisations embarked on the quality improvement route in the hope of sustained organisational and economic growth in the context of a global economy (Flood, 1993:9-10; McDermott, 1993).

The first quality programme implemented in many Western organisations was the Quality Circle-concept of Juran (Ross and Ross, 1982:1-20; Mundel, 1983:87; Whitney, 1988; Berggren, 1992:5, 35; Mills, 1993:284; French and Bell, 1995:242-243; Whetton and Cameron, 1995:538-539). It is worthwhile having a closer look at Quality Circles, because it is generally regarded as the forerunner of TQM (Surak, 1992; Labovitz and Chang, 1990; Dror, 1996; Vloeberghs and Bellens, 1996).

2.4.2 QUALITY CIRCLES

Robbins (1991:244) defines Quality Circles as follows: "a work group of employees, who meet regularly to discuss their quality problems, investigate causes, recommend solutions, and take corrective actions."

Several benefits obtainable from the implementation of Quality Circles have been identified in the literature reviewed. Except for the cost savings advantage, which is often perceived as the primary benefit obtained from implementing Quality Circles, Ross and Ross (1982:19) concluded that quality circle programmes enhanced morale and job satisfaction of the participants, while Skrovan (1983:69) found that team building was revived and employees became more committed to the organisation's goals. Banks (1989:55) noted that Quality Circle members revealed enhanced quality of work-life perceptions as compared to non-members. Membership was also associated with a higher degree of perceived power or influence (Yager, 1980; Shingo, 1986:266-271), while Arbose (1980) found that circle members had a significantly higher perception of job variety than non-members did. Despite the benefits that could be derived from the implementation of Quality

Circle programmes, many organisations in the West did not obtain the anticipated results (Schonberger, 1982:185-187; Cumming, 1985; Mizuno, 1988:11, 117).

2.4.2.1 THE FAILURE OF QUALITY CIRCLE PROGRAMMES

Numerous reasons have been cited for the failure of Quality Circle programmes. A lack of open communication lines resulted in unrealistic expectations on the part of management and employees alike (Huss and Daniel, 1987; Bessant, 1991:254; Axelrod, 1994). Insufficient communication resulted in a lack of participation in Quality Circle programmes and the perception that the programmes were too difficult and complex (see **APPENDIX J**). Therefore, Bessant (1991:255) and Tayeb (1996:199) are of the opinion that participation could have been encouraged if management invested in extensive training, education, development and teambuilding in order to prepare employees for purposeful participation in Quality Circle programmes.

Many organisations followed the extensive training route in an attempt to make their Quality Circle programmes succeed. Yet, the inability to co-ordinate and plan the training programmes often led to the failure of the training. Carter (1994:14) notes that many Quality Circle groups were trained by in-house trainers who would teach facilitation skills, problem solving, and even cost-benefit analysis, but had little exposure to quality tools and techniques that would help the employees to bring home developments more prone to obtain management's attention.

Huss and Daniel (1987) points out that typically internal and external consultants introduced Quality Circle programmes to the organisation. However, the need for consistent training, re-training and re-designing of training programmes after evaluation goes unaddressed, once these consultants leave the organisation. Hence, the role of the trainer and that of the training department were perceived as a dispensable function in the quality approach, because quality was first and foremost the responsibility of the Quality Control department. Training was viewed as a separate organisational activity that is implemented only to rectify quality problems once it has been identified (Mondy and Noe, 1993:339). The result has been a re-active training approach geared towards offering training on the basis of "one-size-fits-all".

Training programmes that have highly participative techniques built into them, can more easily be transferred back to the workplace, but tend to fail if there is insufficient management support for the trainees who have to apply the knowledge and skills back on the job (Mohr and Mohr, 1983:219-220; Taylor, 1989:344). In an attempt to overcome these problems experienced with Quality Circle programmes, many organisations embarked upon the TQM path. The TQM philosophy was viewed as a more holistic approach to quality management. A systematic overview of the TQM philosophy is covered in the next section.

2.4.3 THE TOTAL QUALITY MANAGEMENT PHILOSOPHY

This section defines TQM and describes the attributes and benefits of a TQM programme. The problems experienced with TQM programmes are briefly referred to, as well as the role of training and development in a TQM programme.

2.4.3.1 TOTAL QUALITY MANAGEMENT DEFINED

W. Edwards Deming perceives TQM to be "an organisation's culture, (which) is defined by and supports the constant attainment of customer satisfaction through an integrated system of tools, techniques, and training. This involves the continuous improvement of organisational processes, resulting in high quality products and services" (Sashkin and Kiser, 1993:39).

From the definition it is concluded that TQM is achieved through the use of concepts, tools, and processes, that is lead by an effective leadership, which allows for individual and group involvement and development on a continuous basis in every functional area of the organisation (Webb, 1991:69; La Motta, 1995:57).

2.4.3.2 THE ATTRIBUTES OF A TOTAL QUALITY MANAGEMENT PROGRAMME

Various attributes should be present in an organisation to ensure the successful implementation of TQM. These attributes are as follows:

- The need for an organisational culture in which continuous problem solving is encouraged (Morris and Brandon, 1990:153; Townsend and Gebhardt, 1990:101; Batten, 1992:25; Clutterbuck, 1994:27-28; Masters, 1996).

- The importance of a quality structure to support the TQM processes and ensures the continuous measurement of quality (Huss et al, 1987; Ballantyne, Christopher and Payne, 1991; Bate, 1994:146; Recardo, Molloy and Pellegrino, 1995).

- Emphasising the needs of the customers, both internally and externally to the organisation (Deming, 1972:22-26; Cookes and Baxter, 1992:126).

- The need for supportive quality management systems and effective leadership (Kidder and Ryan, 1996; Tayeb, 1996:199; Taylor, 1996).

- The recognition of the contribution of the human element to a TQM programme (Peters and Waterman, 1982:156-160; Crosby, 1988:viii; Dennis and Stringer, 1992; Gilbert, 1992:7; Mahoney and Thor, 1994:133-137).

- The importance of training and development to enable employees to develop the necessary knowledge and skills to improve their performance (Craig, 1987:19; Angus and Humphrey, 1989:3-7; Bell and Zemke, 1992:130, Fitzgerald, 1992; Lorriman and Kenyo, 1994:96-97; Peters, 1994:228-230; Struebing, 1996).

2.4.3.3 THE BENEFITS DERIVED FROM TOTAL QUALITY MANAGEMENT PROGRAMMES

The benefits of TQM programmes can be characterised into two categories, namely, hard-core business factors and soft-core business factors. Heap (1992:133-134) and Frank (1995) state that TQM contributes to the hard-core business indicators, such as increasing profits and market share, providing return on equity and improving productivity through reduced errors and waste. TQM allows organisations to compete globally and respond to change pro-actively, such as government legislation, global issues and new technological advances (Buzzell and Gale, 1987:86-90; Atkinson, 1990:15; Grahn, 1995).

TQM also provides advantages to what may be termed the soft-core organisational factors, such as increasing employee job satisfaction, less absenteeism, less labour turnover, and better decision-making. Hence, the overall efficiency and effectiveness of the organisation is improved (Christopher and Thor, 1993:10-1.3; Frank, 1995). TQM redefines the role of management and allows for management development, due to the emphasis on employee participation and support, self-directed work teams, and decentralised structures (McIlwee and Roberts, 1991:157;Ciampa, 1992:114-118; Svenson, Wallace and Wallace, 1994:14; Carruthers, 1996).

Despite the benefits that are reported above, concern has been expressed that TQM programmes are also becoming a diminishing management philosophy which is following the same dead-end pathway of Quality Circle programmes.

2.4.3.4 THE PROBLEMS EXPERIENCED WITH TOTAL QUALITY MANAGEMENT PROGRAMMES

Various problems that are encountered in the implementation of a TQM philosophy results in a lack of sustainability and causes TQM programmes to grind to an abrupt halt. These problems include the following:

- Lack of interest on the part of line management and employees to follow the TQM philosophy envisaged for the organisation by top management (Kearney, 1992; Poe and Courter, 1992; Eskildson, 1994).

- The inability of management to create a supportive organisational climate that will encourage employee commitment to the new system (Harrington, 1987:80-84; Cheser, 1994; Stewart, 1994:65; Ciampa, 1992:186;Cherrington, 1994; Hemphill, 1996; Shearer, 1996).

- Failure to include the Human Resources function in designing TQM tasks (Fitzgerald, 1992; Surak, 1992; Huysamen, 1995; Sisson, 1995:3-4; Dror, 1996).

- Disregarding the needs of the employees in adapting to the new TQM philosophy (Walton, 1986:248-249; Stewart, 1994:65; Von Fleet and Paterson, 1994:274; Townley, 1995:614-618; Hubiak and O'Donnell, 1996; James, 1996:195-196).

- A lack of training and development that is conducted on a continuous basis and evaluated regularly to address the needs of the trainees and the line manager (Ciampa, 1992:204-205; Hofmeyer and Rall, 1994; Smit, 1997; Welmans, 1997).

Several suggestions are found in the literature reviewed on how management can resolve these problems experienced in TQM. Sources identify that the answer is revised training and development programmes that are conducted in a systematic manner to assist the organisation in achieving quality (Gilbreath, 1987:67; Bone and Griggs, 1989:74; Rossett and Krumdieck, 1992; Cocheu, 1993:66; Sashkin and Kiser, 1993:17; Carter, 1994:53; Goss, 1994:68). In the following section, the role of training and development in a TQM environment will be investigated to determine the contribution of the training function in achieving improved organisational quality.

2.4.3.5 THE ROLE OF TRAINING AND DEVELOPMENT IN A TOTAL QUALITY MANAGEMENT PROGRAMME

A systematic, needs driven training and development programme provides the organisation with numerous advantages, which includes the following:

- Improving profitability and helps to create a better corporate image (Bowman, 1987:100-101; Clancy, 1989; Heap, 1992:194; McRae, 1992; Veldsman, 1994; Bassi, Cheney and Van Buren, 1997).

- Improves the job knowledge and skills at all levels of the organisation and helps employees to identify with the organisational goals and develop a sense of responsibility to the organisation for being competent and knowledgeable (Barker, 1995:145-151; Ebrahim, 1995; People Dynamics, 1995; Prinsloo, 1995; Samson and Valley, 1996; Babb, 1997).

- Improves the relationship between the line manager and the employees, while aiming to establish a culture that fosters authenticity, openness and trust (Johnson, 1985; Inguagiato and Rubin, 1991; Rothwell and Kazanes, 1994:398; Goss, 1994:64).

- Aids in improving organisational communication and assist employees in adjusting to change, thereby helping to prevent stress and tension (Humphrey, 1990; Spiess, 1993; Bloom, Calori and De Woot, 1994:80-81; Motwani, Frahm and Kathawala, 1994; Kessler, 1995:478-481).

- Aids in developing leadership skills, motivation, loyalty, better attitudes, and other aspects that successful workers and managers usually display (Beach, 1985:244: Hanlin and Johns, 1991; Hayden, 1992; Skinner and Ivancevich, 1992:339-352; Conway, 1993:2-4.13 – 2-4.14; Whether and Davis, 1993:307-308; Schultz, 1994:32-33; McGill and Beaty, 1995:184-187).

- Helps prepare guidelines for work and facilitates organisational development (Gallagan, 1990; Senge, 1991:32; Obeng, 1994:80).

- Aids in understanding and carrying out organisational policies, increasing productivity and/or quality of work, while keeping costs down to a minimal (Middleton, Ziderman and Adams, 1993; Malecki, 1994:146-152; Kendrick, 1993:10-10.1 – 10-10.3).

In order for organisations to achieve the benefits listed above, training and development should be viewed as an ongoing, creative learning process to equip the employees in the organisation with the knowledge and skills needed for TQM to be established. The literature reviewed has identified that a pro-active, co-ordinated and results-orientated training approach will provide a greater impact than applying training programmes re-actively and in an unco-ordinated manner that is not linked to the strategic goals of the organisation and the needs of the employees.

2.5 CONCLUDING REMARKS

Considering the contribution that TQM can make towards improving organisational performance, productivity and increasing profits, it is crucial for any organisation to be able to sustain the TQM programme implemented. Re-active training programmes lead to the demise of Quality Circle programmes. Therefore, it is inevitable that the training approach that organisations pursue should be examined, in order to determine whether an intentional – or a random – training approach makes the greatest contribution to the implementation of a TQM programme.

TQM programmes have been implemented in many South African manufacturing industries. The research conducted focused on the largest manufacturing sector, namely the food manufacturing industry to determine whether an Activity- or Impact training approach is followed when implementing TQM programmes.

2.6 THE FOOD MANUFACTURING INDUSTRY

A brief discussion on the role and challenges faced by the South African food manufacturing industry follows:

2.6.1 THE FOOD MANUFACTURING INDUSTRY DEFINED

The objective of the food industry is "to deliver to the market place a choice of safe highly acceptable foods from which consumers can select a diet which is adequate to meet their nutritional, social, economic and organoleptic needs whilst at the same time maintaining the vigour and viability of the industry itself" (Gorsuch, 1989). The food manufacturing industry is constantly undergoing changes and according to Sloan, Powers and Hom (1987:47) food manufacturing organisations perceive that in ten years time 50 percent of their market sales will come from goods that are not yet on the market.

2.6.2 THE CHALLENGES FACED BY THE FOOD MANUFACTURING INDUSTRY

The food manufacturing industry faces numerous challenges in the next decade, *inter alia* would be the impact of the population size on the demand for and the supply of food. Projections of the Food and Agriculture Organisation (FAO) and the World Bank suggests a growth rate of at least four percent per annum in food production for the next two decades to meet increasing demands (Srinivasan, 1988:13; Yannakou, 1994). Therefore, food manufacturing organisations will have to develop the means to increase their production, yet keep their products cost-effective and of a high quality (Yannakou, 1994).

An increase in food prices and the emphasis on high quality food products have lead to changes in consumer preferences. Consumers have expressed the need for convenient food products to meet up with a busier lifestyle (Hughson, 1997), yet there is still the demand for food that is tasty, healthy, affordable and caters for the consumers' zest for variety (Hollingsworth, 1996a; Sloan, 1997; Wilson, 1997). Various other concerns have been expressed in the literature reviewed such as the need for dietary balance and nutrition programmes (Anderson, 1992:170; Murphy, 1996; McGill, 1997; Taylor, 1997), the importance of microbiological food safety (Food Review, 1997; Tuley, 1997) and increased concern for shelf life (Proudlove, 1990:15-30; International Food Hygiene, 1997).

The future survival of the food manufacturing industry is dependent upon the ability of organisations to adapt to changing environments, which entails meeting consumer demands and addressing their concerns regarding food quality. Hollingsworth (1996b)

maintains that food organisations will be required to plan for a complex market and should do so with responsiveness to customer needs (both internal and external), in a coherent manner, while emphasising quality and thoroughness in all operations, departments and the organisation as a whole.

In the light of the above, the need for TQM in the food manufacturing industry will have to be reviewed to determine whether the policies and procedures in place, aid the development of the workforce to react efficiently and effectively when faced by new organisational goals brought about by international demands. It is not only organisations abroad which are faced with increasing demands, but the South African food manufacturing industry is also being affected by international changes, especially since the country's re-entry into international markets.

2.6.3 THE SOUTH AFRICAN FOOD MANUFACTURING INDUSTRY

The Central Statistical Services (CSS) has divided the South African food manufacturing industry into 13 categories (see **APPENDIX K**), which makes up the largest segment of the country's manufacturing sector (RSA Statistics in brief, 1997:13.1). Since 1987 the food manufacturing industry has not only been the largest contributor to the value of sales in the total manufacturing indices, but has also produced the largest gross output (CSS, Statistical Release P3041.3, 1995:37) (refer to **APPENDICES L and M**). Hence, the food manufacturing industry is making the largest contribution to the Gross Domestic Product (GDP) of the country. Despite these performances identified, the food manufacturing industry is also experiencing problems.

Since 1990 food prices have increased locally by 90 percent, in contrast with 60 percent for all other goods (World Bank, 1990:196; Rees and Makgetla, 1995). Consequently the increases in food prices have caused the profitability (net profit after tax on turnover) of the industry to decrease over the last three years (CSS, Statistical Release P3042.1, June, 1996:1 and March, 1997:1). On the international front, accords such as the General Agreement of Tariffs and Trade (GATT) and alliances like the European Community are redesigning quality perimeters to which South African food manufacturers need to adapt (Alexander, 1996; Food Review, 1996; Hollingsworth, 1997).

Many South African food manufacturing companies are attempting to overcome these problems by following the TQM philosophy, which emphasises quality, cost-effectiveness and customer satisfaction (both internally and externally). Organisations often implement a vigorous training and development programme developing employees' skills, knowledge and attitudes to increase quality, decrease costs and exceed customers' expectations.

Yannakou (1995) recognises the need for, and the importance of, staff training in that it provides organisations with the opportunity to adapt to change. Yet, training programmes often fail to deliver the expected results, due to a lack of sustainability, support and relevant information that could act as a baseline against which a training programme could be evaluated. However, there is no registered Food Manufacturing Training Board in South Africa to provide information on the training expenditure, the types of training programmes implemented, as well as the success or failure rates of these training programmes and the reasons therefore.

Taking into consideration the importance of the food manufacturing sector to the South African economy, the training approach followed within the industry should be investigated to determine whether a needs driven, cost-effective and results-orientated approach is being pursued when TQM programmes are being implemented.

Therefore, the purpose of this investigation is to establish the relationship between Activity- and Impact training in selected South African companies, with reference to Human Resources support service programmes, in order to establish how training for specific purposes relates to TQM in companies operating in a dynamic business environment.

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CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

Chapter two reviewed the literature pertaining to the difference between the Activity and Impact training approaches and the contribution of each of these approaches to the successful implementation of a TQM programme. In Chapter three the data used in the research will be classified and the selection criteria that the researcher applied are identified. An overview of the research methodology used and the specific treatment of each sub-problem thus follows:

3.2 THE DATA

The data of this investigation is two folded: primary data and secondary data. The nature of each of these two categories of data is described below.

3.2.1 THE PRIMARY DATA

Wegner (1995:13) states that primary data is obtained at the moment where it is produced and such data is initially for a specific purpose. For the purposes of this research the primary data was obtained from the TQM questionnaires (see **APPENDIX N**) that were distributed to the various South African food manufacturing organisations to establish the

relationship between Activity and Impact training in food manufacturing organisations that implemented TQM programmes.

3.2.2 THE SECONDARY DATA

Secondary data is compiled and prepared by other investigators (Wegner, 1995:14). In Chapter two the various literature sources available on the subject matter has been reviewed and presented in a systematic manner to distinguish between the Activity and Impact training approaches and how these approaches relate to the training phases followed when a TQM programme is implemented.

3.3 SELECTION CRITERIA

Initially, the researcher endeavoured to delimit the research to the food manufacturing organisations in the KwaZulu Natal region. A list of the major food manufacturing companies in the province was obtained from the Durban Chamber of Commerce. The researcher conducted a pilot study within the KwaZulu Natal area. However, the response within the region failed to deliver a representative sample, that is, a minimum of 120 fully completed questionnaires. Consequently, the questionnaires were distributed nationally in an attempt to obtain a representative sample and the following procedure, as advised by the Human Science Research Council *(HSRC)*, was followed:

All the names of the South African food manufacturing organisations listed in the Commercial Directory of Southern Africa (1997:2; 24; 46; 51; 80; 139; 209-214; 221; 251; 315; 408; 434-436) were obtained. The companies were then divided into the 13 categories of the food manufacturing industry as compiled by the Central Statistical Services (CSS) and shown in **APPENDIX K**. The researcher added one more category[4] to the classification list to facilitate the breakdown further.

Each company was allocated a consecutive number ranging from one, until the total number of organisations per division (i.e.14 categories) was covered. A systematic random sample was then selected to ensure the equiprobability of each population member being included in the sample and to protect the validity of the research by controlling the biasing influence of extraneous variables (Ferguson, 1976:131; 215). A total of 60 organisations per division were selected using a Table of Random Numbers generated by Mason and Lind (1990:855) (see **APPENDIX O**). There were only two divisions were less than 60 organisations were listed. Thus, using systematic sampling, the sample was selected per category (see **APPENDIX P**). In all instances questionnaires where sent to all the organisations listed within these divisions.

A total of 792 food manufacturing organisations were selected (N = 792) and 380 organisations returned the questionnaires, of which 228 respondents indicated that they implemented TQM. However, only 172 questionnaires were fully completed and used as the research sample (n = 172).

[4] The Butter and Cream category was added.

3.4 THE DATA COLLECTION METHODS

There was no known standardised measuring instrument available to address the problem statement and the various sub-problems. Consequently, the researcher had to design the measuring instrument based on the literature reviewed, as depicted in Chapter two. The data-collection method selected is the questionnaire-technique, due to the admissibility thereof in obtaining relevant data when respondents are scattered over a wide area (Hanke and Reitsch, 1991:20).

3.4.1 THE QUESTIONNAIRE DESIGN

Wegner (1995:17) believes: "the *design* of a questionnaire is critical to ensure that the correct research questions are addressed and that accurate and appropriate data for statistical analysis is collected". In view of this statement, the researcher has used various sources to act as a guideline in drawing up the questionnaire (Behr, 1973:72-81; Rudestam and Newton, 1992:68-70; Wegner, 1995:18-19). Three critical areas pertaining to the design phase of the questionnaire have been identified and are discussed below.

3.4.1.1 THE CONTENT VALIDITY OF THE QUESTIONNAIRE

In drawing up the questionnaire the content validity of the measuring instrument needs to be determined to ensure that the questionnaire covers the necessary content that would be relevant to the hypotheses that have been formulated (Rudestam and Newton, 1992:67).

The researcher undertook three pilot studies before the final questionnaire was distributed to the respondents. The Human Science Research Council (HSRC) advised that the initial pilot study should include a broader spectrum of respondents to increase the content precision of the questionnaire, in terms of relevance, clarity and understanding.

Five organisations in the wider Durban area, of which two were operating in the food manufacturing industry, were contacted telephonically. A meeting was set up with a contact person in each company and the researcher left five questionnaires to be completed by five independent respondents, as selected by the contact person. Follow-up meetings with each of the 25 respondents were arranged to collect the questionnaires. During these meetings the personal interview technique was used to elicit the opinion of the respondent and identify problems encountered when the questionnaire was administered.

Based on the information obtained during the first pilot study, changes were made to the questionnaire and a second pilot study following the exact procedure discussed above was conducted. However, five different organisations were used to those that participated in the first pilot study. Changes were made to the questionnaire based on the second pilot study and the revised version was submitted to the Human Science Research Council (HSRC) to be scrutinised.

Based on the recommendations made by the Human Science Research Council (HSRC), the third pilot study followed. Six Durban-based food manufacturing organisations, which had not been used in the previous pilot studies, were approached and a meeting was set up with a contact person. Twenty independent respondents per organisation completed the

questionnaires that were left with the contact person and collected after one month. Follow-up meetings with the respondents were not held in the third pilot study, but based on recommendations that were filled in on the questionnaires, changes were made accordingly. The final copy was submitted to the Human Science Research Council (HSRC) to be examined, after which it was distributed to the sample population (refer to **APPENDIX N**).

3.4.1.2 THE RELIABILITY OF THE QUESTIONNAIRE

Reliability refers to the ability of a measure to produce consistent results (Rudestam et al, 1992:67). The reliability of the measuring instrument was determined statistically by means of relevant statistical tools, which are reported in Chapter four.

3.4.1.3 THE STRUCTURE OF THE QUESTIONNAIRE

The instrument for this study was the self-administered questionnaire consisting of 40 questions and divided into four sections. Each of the four sections will be discussed below:

3.4.1.3. (a) SECTION ONE: BIOGRAPHICAL INFORMATION

The biographical section covered the company's name and the department that completed the questionnaire. Five demographic questions followed with three options each, from which the respondents could choose. The demographic questions covered aspects such as

the operational level of the particular respondent, number of employees and the offset area of the organisation.

3.4.1.3. (b) SECTION TWO: QUALITY

Section two of the questionnaire contains two questions with three options each that are based on the literature reviewed relating to Quality Circles.

3.4.1.3. (c) SECTION THREE: TOTAL QUALITY MANAGEMENT

The respondents were asked to report on the implementation of the TQM programme in the organisation by selecting the most appropriate option listed for each of the five questions in this sub-section.

3.4.1.3. (d) SECTION FOUR: TRAINING AND DEVELOPMENT

The last section of the questionnaire was drawn based on the literature reviewed pertaining to the Activity and Impact training approaches. The 29 questions in section four are divided into two parts. A three-point Likert scale was used for the first nine questions that related to the responsibility for training when implementing a TQM programme. The second part focussed on the Activity and Impact training approaches and was covered in questions 21 to 40 using a five point Likert scale.

3.5 PROCEDURE

The following procedure was followed in conducting the research. The 792 food manufacturing organisations selected were entered on a database using the Microsoft Office 1997 Access package (Cassel, 1994: 276-339; Neibauer, 1997:119-148). The data was captured according to the divisions of the food manufacturing industry, using a full description of the company's name and address. Each entry in the database system was allocated a consecutive number (ranging from one to 792), that corresponded with the number on the questionnaire eventually submitted to the organisation in order to simplify the verification of responses.

The researcher posted a precontact letter to each of the 792 respondents seeking their participation in the research project. Three weeks after the precontact letter was posted the mail survey packet was sent, which consisted of a covering letter, the questionnaire (**APPENDIX N**) and a pre-stamped, self-addressed return envelope.

The sample (n = 172) was captured on the Statistical Package for the Social Sciences (SPSS) to analyse the data to determine whether the hypotheses are supported, or rejected (Nie, Hull, Jenkins, Steinbrenner and Bent, 1975:1-5). The statistical tools used for each sub-problem are discussed below and the findings of the research are reported in Chapter four.

3.6 THE SPECIFIC TREATMENT OF EACH SUB-PROBLEM

The specific treatment of the three sub-problems is as follows:

3.6.1 THE PROBLEM STATEMENT

The purpose of this investigation is to establish the relationship between Activity and Impact training in selected South African food manufacturing companies, with reference to Human Resources support service programmes, in order to establish how training for specific purposes relates to TQM in companies operating in a dynamic business environment.

3.6.2 THE FIRST SUB-PROBLEM

The first sub-problem is to evaluate Activity training with reference to Human Resources support service programmes in order to determine the contribution of cause-orientated training to the overall TQM goals and objectives of an organisation.

3.6.2.1 THE FIRST HYPOTHESIS

The Activity training approach fails to contribute to the successful implementation of a TQM programme.

3.6.2.2 THE DATA NEEDED

The data for testing the first hypothesis is obtainable from the responses to the TQM questionnaire (**APPENDIX N**).

The following data from the questionnaire had to be obtained:

- The Training and Development department fails to identify a client base.
- The TQM training offered is not linked to the business needs of the organisation.
- The Training and Development department does not assess the performance effectiveness of the TQM training intervention.
- There is no effort to prepare the work environment to support the TQM training offered.
- The outcome of the TQM training programme is not measured.

3.6.2.3 THE LOCATION OF THE DATA

Only the responses from the selected sample (n = 172) that had completed the questionnaire were included in the study.

3.6.2.4 THE MEANS OF OBTAINING THE DATA

The data needed for the empirical investigation have been collected by means of the questionnaire, that has been described in the Data Collection Method section.

3.6.2.5 TREATMENT OF THE DATA

The completed questionnaires were screened to determine whether all the questions were completed. Only the questionnaires that were duly completed were included in the research.

3.6.2.6 THE INTERPRETATION OF THE DATA

The Chi-square statistic was chosen to interpret the data. This statistical tool establishes whether a random variable, in this instance the Activity training approach followed in the food manufacturing organisations, follows certain patterns of outcomes in the population.

The Chi-square statistic tests the null hypothesis by comparing a set of observed frequencies (from the responses to the questionnaire), which are based on sample findings, to a set of expected frequencies.

The Chi-square statistic measures the extent to which the observed and expected frequencies differ. If this measure of difference is small, then the null hypothesis is accepted. Conversely, large differences will result in the null hypothesis being rejected.

3.6.3 THE SECOND SUB-PROBLEM

The second sub-problem is to evaluate Impact training with reference to Human Resources support service programmes in order to determine the significant contribution of result-orientated training to the extensive business needs of an organisation implementing TQM.

3.6.3.1 THE SECOND HYPOTHESIS

The Impact training approach contributes to the successful implementation of a TQM programme.

3.6.3.2 THE DATA NEEDED

The data for testing the second hypothesis was captured from the responses to the TQM questionnaire (**APPENDIX** N).

The following data had to be obtained from the questionnaire:

- The Training and Development department identified a client base.
- The TQM training offered is linked to the business needs of the organisation.
- The Training and Development department assesses the performance effectiveness of the TQM training intervention.

- The work environment is supportive of the TQM training offered.

- The outcome of the TQM training programme is measured to determine the contribution thereof to the organisation.

3.6.3.3 THE LOCATION OF THE DATA

Only the responses from the selected sample (n = 172) that had completed the questionnaire were included in the study.

3.6.3.4 THE MEANS OF OBTAINING THE DATA

The data required to accept or reject the second hypothesis, have been collected by means of the TQM questionnaire (**APPENDIX N**).

3.6.3.5 TREATMENT OF THE DATA

The completed questionnaires were screened to establish whether all the questions were answered. Only the questionnaires that were fully completed were included for analysis.

3.6.3.6 THE INTERPRETATION OF THE DATA

The Chi-square statistic was selected to clarify the available figures and to determine whether a systematic relationship exists between two variables. In this instance, the Impact

training approach is analysed in comparison to the outcomes of the population. This is done by calculating the expected cell frequencies if no relationship exists between the variables, given the present row and column totals. The expected cell frequencies are then compared to the actual values found in the table according to the Chi-test formula to accept or reject the null hypothesis (Nie, et al, 1975:223).

3.6.4 THE THIRD SUB-PROBLEM

The third sub-problem was to integrate the findings of cause–orientated training and results-orientated training in order to evaluate the effects of a training strategy focussing on training for specific purposes and its impact on the implementation of TQM.

3.6.4.1 THE THIRD HYPOTHESIS

There is no relationship between the Activity and Impact training approaches.

3.6.4.2 THE DATA NEEDED

The data to test the third hypothesis was obtained from the responses to the TQM questionnaire (**APPENDIX** N). The data obtained from the first and second hypotheses had to be correlated to determine whether, or not, a relationship exists between Activity and Impact training in selected South African food manufacturing companies.

3.6.4.3 THE LOCATION OF THE DATA

Only the responses from the selected sample (n = 172) that completed the questionnaire were included in the study.

3.6.4.4 THE MEANS OF OBTAINING THE DATA

The data required to accept or reject the third hypothesis have been collected by means of the TQM questionnaire (**APPENDIX N**).

3.6.4.5 TREATMENT OF THE DATA

The completed questionnaires were screened to establish whether all the questions were answered. Only the questions that were fully completed were included for analysis.

3.6.4.6 THE INTERPRETATION OF THE DATA

The Chi-test statistic was chosen to determine whether a significant relationship exists between the Activity and Impact approaches to training.

3.7 CONCLUDING REMARKS

Chapter three described the research tools and methods used during this investigation to obtain relevant information from the sample population. In Chapter four, based on the materials and methods described above, the results of the research is reported.

- * -

CHAPTER FOUR

RESULTS AND FINDINGS

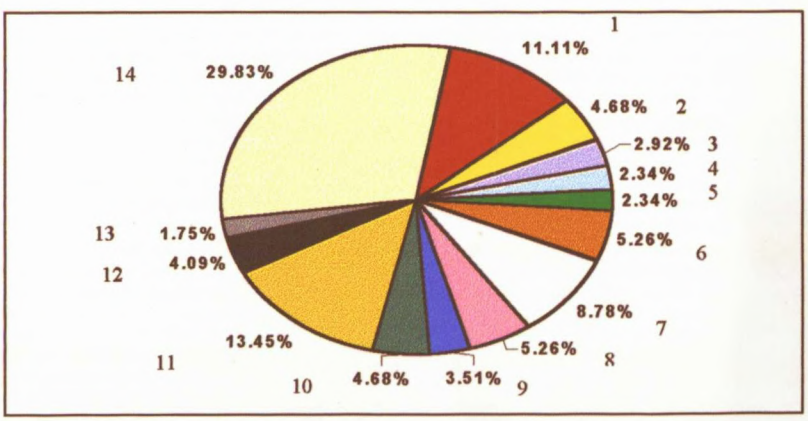
4.1 INTRODUCTION

This chapter reports the research findings, which are divided into four sections based on the TQM questionnaire (see **APPENDIX N**).

4.2 KEY BIOGRAPHICAL INFORMATION

Two sets of key biographical details were obtained that summarises the nature of the sample population (n=171). The first set of key biographical information (see **PIE CHART 4-1**) reveals the percentage response rate for the various divisions of the South African food manufacturing industry.

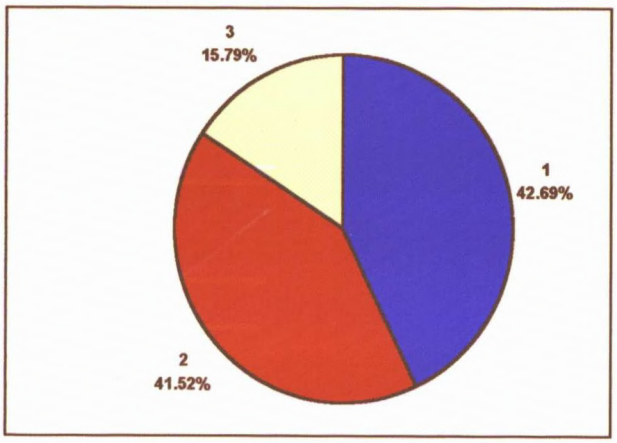
PIE CHART 4-1: PERCENTAGE RESPONSE PER DIVISION IN THE SAMPLE POPULATION (STATEMENT 1)



1. Dairy products / Ice cream
2. Animal slaughtering / poultry dressing
3. Butter and Cream
4. Sugar
5. Coffee roasting / tea blending & packaging
6. Bakery products
7. Flour and other grain mill products
8. Canned and preserved fruit and vegetables
9. Canned and prepared meats
10. Canned and preserved fish
11. Chocolates, sugar confectionery and cocoa
12. Cooking oils, edible oils and margarine
13. Roasted peanuts and other nuts
14. Other

The second set of key biographical information (Statement 2) pertains to the level at which the organisations, that participated in the research survey, operate at, i.e. regionally, nationally and/or internationally (refer to **PIE CHART 4-2**).

PIE CHART 4-2: PERCENTAGE RESPONSE RATE PER OPERATIONAL LEVEL WITHIN THE SAMPLE POPULATION (STATEMENT 2)



1. Regional Level
2. National Level
3. International Level
   (Multi-national organisations)

4.3 KEY QUALITY INDICATORS

An important indicator for the study was whether quality programmes were in place within the sample population. In this regard the following responses, as depicted in **TABLE 4-1**, were received in respect of Quality Circle programmes (Statement 6).

TABLE 4-1: PERCENTAGE RESPONSE RATE FOR THE IMPLEMENTATION OF QUALITY CIRCLES WITHIN THE SAMPLE POPULATION (STATEMENT 6)

STATEMENT:	STATEMENT 6 (option 1): Quality Circles are presently implemented	STATEMENT 6 (option 2): Quality Circles have never been implemented	STATEMENT 6 (option 3): Quality Circles are no longer implemented
% RESPONSE:	47.37%	38.01%	14.62%

It has been noted earlier in the literature survey, that Quality Circles were often implemented before organisations switched to TQM training programmes.

4.4 THE RESULTS ON TOTAL QUALITY MANAGEMENT

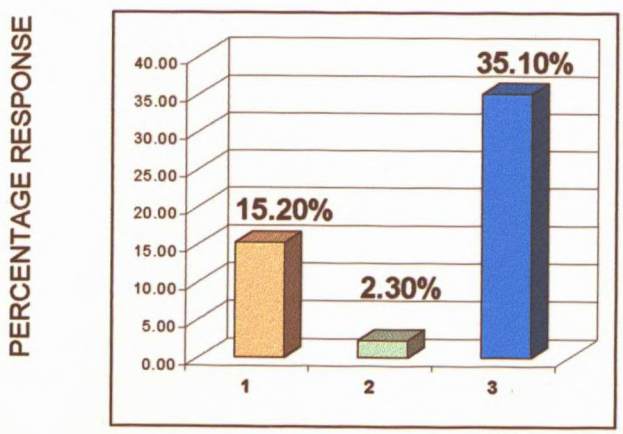
The literature review suggests that several significant factors, such as Quality Circles, the implementation period of the TQM strategy, the design of the TQM strategy, and who is responsible for communicating TQM changes in an organisation. These tend to impact on the credibility of a TQM programme, irrespective whether an Activity or Impact training approach is used. These factors are highlighted in section three of the questionnaire, which consists of four questions pertaining to the implementation of the TQM strategy and the overall credibility of the TQM training programme within the sample population. Firstly, a comparison was made between Statements 6 and 10 to establish the contribution that Quality Circles make towards enhancing the credibility of TQM training programmes (see **TABLE 4-2**).

TABLE 4-2: COMPARISON BETWEEN STATEMENTS 6 AND 10

	STATEMENTS:	STATEMENT 6 (option 1): QC are presently implemented	STATEMENT 6 (option 2): QC has never been implemented	STATEMENT 6 (option 3): QC are no longer implemented
% RESPONSE	STATEMENT 10 (option 1): TQM training is credible	25.88%	16.95%	9.94%
	STATEMENT 10 (option 2): TQM training lacks credibility	21.63%	21.05%	4.67%

Those respondents who indicated that TQM training programmes lack credibility (option 2 of Statement 10) were requested to identify with which constituency does TQM training programmes lack credibility within their respective organisations. These responses are depicted in **BAR CHART 4-1**.

BAR CHART 4-1: A BREAKDOWN OF THOSE RESPONDENTS WHO INDICATED THAT TQM TRAINING PROGRAMMES LACK CREDIBILITY WITHIN THEIR ORGANISATIONS



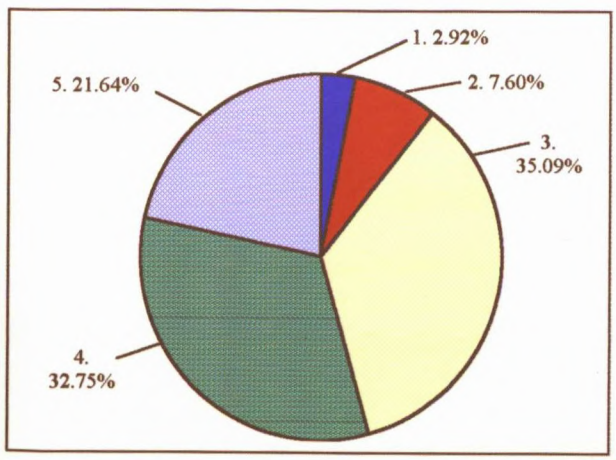
1. TQM training lacks credibility with employees
2. TQM training lacks credibility with line management
3. TQM training lacks credibility with both employees and management

In addition, the contribution of Statements 7, 8 and 9 towards the credibility of a TQM training programme were determined and the results are as follows:

4.4.1 THE CREDIBILITY OF A TQM TRAINING PROGRAMME (STATEMENT 10) AND THE PERIOD OF TQM IMPLEMENTATION (STATEMENT 7)

Statement 7 relates to the length of time that TQM has been implemented within the sample population and can be seen in **PIE CHART 4-3**.

PIE CHART 4-3: PERCENTAGE RESPONSE FOR THE PERIOD OF TQM IMPLEMENTATION WITHIN THE SAMPLE POPULATION (STATEMENT 7)



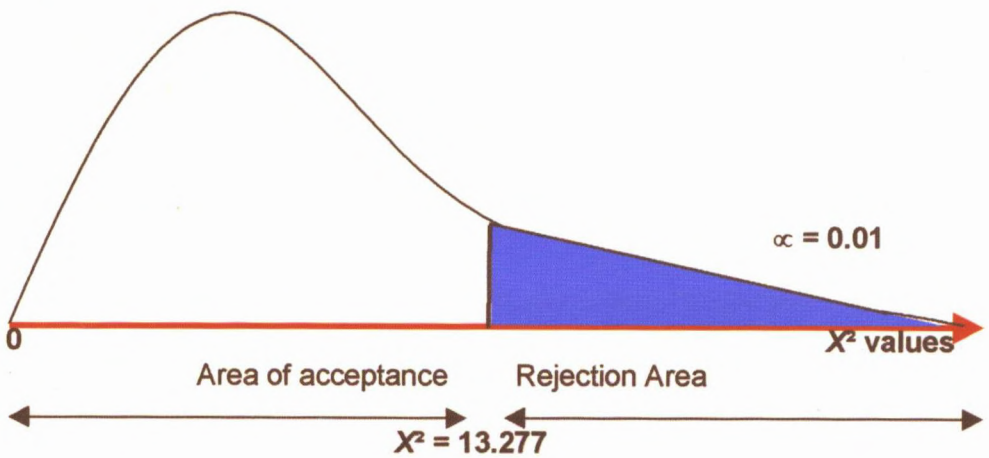
1. Less than six months
2. More than six months, but less than a year
3. More than a year, but less than three years
4. More than three years, but less than five years
5. More than five years

The Chi-square statistical test was used to determine whether a dependent or an independent relationship exists between the credibility of a TQM training programme (Statement 10) and the length of time TQM has been in existence within an organisation (Statement 7). These are reported in **TABLE 4-3** and **APPENDIX Q**.

TABLE 4-3: RESULTS OF THE CHI-SQUARE STATISTIC FOR STATEMENTS 7 AND 10

CHI-SQUARE:	VALUE:	DF:	SIGNIFICANCE:
Pearson	13.95193	4	0.00745
Likelihood Ratio	14.23665	4	0.00658
Mantel-Haenszel test for linear association	2.67691	1	0.10181

Graphically:



The decision rule is: Accept Ho if $X^2 \leq 13.277$

Reject Ho if $X^2 > 13.277$

Therefore: Reject Ho at the one percent level of significance.

The Chi-square sample statistic (χ^2calc = 13.95193) lies outside the area of acceptance (i.e. more than $\chi^2 = 13.277$). At the one percent level of significance ($p \leq 0.01 = \alpha$) it may be concluded that Statements 10 and 7 are dependent at p=0.00745. Therefore, a very strong association exists between the credibility of a TQM training programme and the length of time such a programme has existed within the organisation.

4.4.2 THE CREDIBILITY OF THE TQM TRAINING PROGRAMME (STATEMENT 10) AND THE DESIGN OF THE TQM STRATEGY (STATEMENT 8)

Statement 8 identifies the person who is responsible for designing an organisation's TQM strategy. In this regard, the responses obtained from the sample population are depicted in **TABLE 4-4**.

TABLE 4-4: PERCENTAGE RESPONSE FOR WHO HAD DRAWN UP / DESIGNED THE TQM STRATEGY WITHIN THE SAMPLE POPULATION (STATEMENT 8)

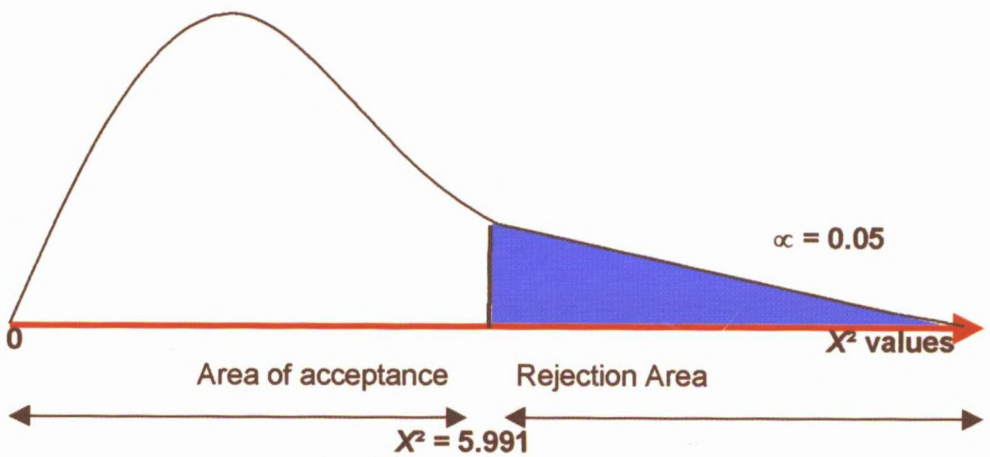
STATEMENT:	STATEMENT 8 (option 1): Consultant	STATEMENT 8 (option 2): Management	STATEMENT 8 (option 3): Both
% RESPONSE:	20.47%	60.82%	18.71%

The Chi-square statistical test was then used to determine whether a dependent or an independent relationship exists between the credibility of a TQM training programme and the person responsible for designing the TQM strategy (see **TABLE 4-5** and **APPENDIX R**).

TABLE 4-5: RESULTS OF THE CHI-SQUARE STATISTIC FOR STATEMENTS 8 AND 10

CHI-SQUARE:	VALUE:	DF:	SIGNIFICANCE:
Pearson	3.03031	2	0.21977
Likelihood Ratio	3.08100	2	0.21427
Mantel-Haenszel test for linear association	1.75046	1	0.18582

Graphically:



The decision rule is: Accept Ho if $X^2 \leq 5.991$

Reject Ho if $X^2 > 5.991$

Therefore: Reject Ho at the five percent level of significance.

The Chi-square sample statistic (χ^2_{calc} =3.030314) lies within the area of acceptance (i.e. less than χ^2 = 5.991). At the five percent level of significance ($p \leq 0.05 = \alpha$) it may be concluded that Statements 10 and 8 are independent at p=0.21977. Therefore no association exists between the credibility of a TQM training programme and who had designed the TQM strategy for the organisation.

Although no significant relationship was found to exist between Statements 8 and 10, the results obtained in the Chi-test might be related to the length of time that the TQM training programme has existed in an organisation. Therefore, the responses for Statement 10, 8 and 7 were compared to determine whether a trend could be noted for the credibility of a TQM training programme, who was responsible for the TQM strategy and the length of time that the TQM training programme has been existence in the organisation (as depicted in **TABLE 4-6**).

TABLE 4-6: COMPARISON BETWEEN THE RESPONSES FOR STATEMENTS 10, 7 AND 8

STATEMENT 10	THE PERIOD OF TQM IMPLEMENTATION (STATEMENT 7)	WHO HAD DRAWN UP THE TQM STRATEGY (STATEMENT 8)	PERCENTAGE RESPONSE	TOTAL %
OPTION 1: TQM TRAINING PROGRAMMES LACK CREDIBILITY	OPTION 1: (0- < 6 MONTHS)	OPTION 1: CONSULTANT OPTION 2: MANAGEMENT OPTION 3: BOTH	0 1.75% 0.58%	2.33%
	OPTION 2: (6- < 12 MONTHS)	OPTION 1: CONSULTANT OPTION 2: MANAGEMENT OPTION 3: BOTH	0 2.92% 0.58%	3.50%
	OPTION 3: (1- < 3 YEARS)	OPTION 1: CONSULTANT OPTION 2: MANAGEMENT OPTION 3: BOTH	2.92% 8.19% 1.17%	12.28%
	OPTION 4: (3- < 5 YEARS)	OPTION 1: CONSULTANT OPTION 2: MANAGEMENT OPTION 3: BOTH	7.01% 11.69% 2.93%	21.63%
	OPTION 5: (MORE THAN 5 YEARS)	OPTION 1: CONSULTANT OPTION 2: MANAGEMENT OPTION 3: BOTH	3.50% 5.27% 4.09%	12.86%
SUB-TOTAL %				52.63%
OPTION 2: TQM TRAINING PROGRAMMES ARE CREDIBLE	OPTION 1: (0- < 6 MONTHS)	OPTION 1: CONSULTANT OPTION 2: MANAGEMENT OPTION 3: BOTH	0 0.58% 0	0.58%
	OPTION 2: (6- < 12 MONTHS)	OPTION 1: CONSULTANT OPTION 2: MANAGEMENT OPTION 3: BOTH	0 2.34% 1.75%	4.09%
	OPTION 3: (1- < 3 YEARS)	OPTION 1: CONSULTANT OPTION 2: MANAGEMENT OPTION 3: BOTH	1.75% 16.96% 4.09%	22.80%
	OPTION 4: (3- < 5 YEARS)	OPTION 1: CONSULTANT OPTION 2: MANAGEMENT OPTION 3: BOTH	2.92% 6.43% 1.75%	11.11%
	OPTION 5: (MORE THAN 5 YEARS)	OPTION 1: CONSULTANT OPTION 2: MANAGEMENT OPTION 3: BOTH	2.33% 4.67% 1.77%	8.77%
SUB-TOTAL %				47.36%
TOTAL %				100%

The responses obtained for Statements 10, 7 and 8, as depicted in **TABLE 4-6**, were then further analysed. The five options for Statement 7 were grouped into two categories, namely a period of less than three years that TQM training programmes have been implemented and an implementation period of longer than three years (as shown in **TABLE 4-7**).

TABLE 4-7: CATAGORICAL BREAKDOWN OF STATEMENT 7 AS COMPARED TO STATEMENTS 8 AND 10

STATEMENTS:	STATEMENT 7	STATEMENT 8: Combined percentage for each option			Total %
		(option 1): Consultant	(option 2): Management	(option 3): Both	
STATEMENT 10 (option 1): TQM training programmes lacks credibility	TQM training programmes have been implemented for less than three years	2.92%	12.85%	2.32%	18.09%
	TQM training programmes have been implemented for longer than three years	1.75%	19.86%	5.84%	27.45%
STATEMENT 10 (option 2): TQM training programmes are credible	TQM training programmes have been implemented for less than three years	10.51%	16.95%	7.01%	34.47%
	TQM training programmes have been implemented for longer than three years	5.25%	11.10%	3.50%	19.85%

In those instances were the TQM strategy has been pursued in an organisation for less than three years, the credibility of the TQM training programme is notably higher, especially if the TQM strategy was designed by management and/or a consultant. However, the longer an organisation continued to implement the TQM strategy, i.e. longer than three years, but less than five years, the less credible the TQM training programme became, irrespective who had designed the TQM strategy.

4.4.3 THE CREDIBILITY OF THE TQM TRAINING PROGRAMME (STATEMENT 10) AND WHO IS RESPONSIBLE FOR COMMUNICATING TQM CHANGES (STATEMENT 9)

Statement 9 identifies who is responsible for communicating TQM changes within the sample population. The respondents indicated that the line manager is answerable for communicating TQM changes within the organisation (refer to **TABLE 4-8**).

TABLE 4-8: PERCENTAGE RESPONSE FOR WHO IS RESPONSIBLE FOR COMMUNICATING TQM CHANGES WITHIN THE ORGANISATION (STATEMENT 9)

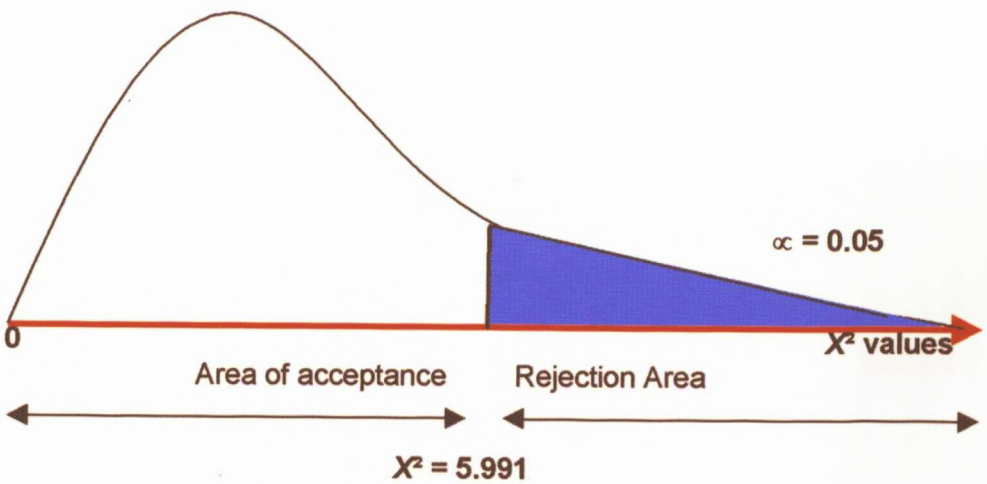
STATEMENT:	STATEMENT 9 (option 1): Line managers	STATEMENT 9 (option 2): Consultant	STATEMENT 9 (option 3): Training Department
% RESPONSE:	90.64%	3.51%	5.85%

The Chi-square statistical test was then used to establish whether a dependent or an independent relationship exists between the credibility of a TQM training programme and who is responsible to communicate the TQM changes within the organisation. The results of the Chi-square statistic for Statements 9 and 10 are depicted in **TABLE 4-9** and **APPENDIX S**.

TABLE 4-9: RESULTS OF THE CHI-SQUARE STATISTIC FOR STATEMENT 9 AND 10

CHI-SQUARE:	VALUE:	DF:	SIGNIFICANCE:
Pearson	8.06694	2	0.01771
Likelihood Ratio	9.02086	2	0.01099
Mantel-Haenszel test for linear association	5.59994	1	0.01796

Graphically:



The decision rule is: Accept H_o if $X^2 \leq 5.991$

Reject H_o if $X^2 > 5.991$

Therefore: Reject H_o at the five percent level of significance.

The Chi-square sample statistic (χ^2calc = 8.066941) lies outside the area of acceptance (i.e. more than χ^2 = 5.991). At the five percent level of significance ($p \leq 0.05 = \alpha$) it may be concluded that Statements 9 and 10 are dependent at p=0.01771. Therefore, a dependent relationship exists between the credibility of a TQM training programme and who is responsible for communicating TQM changes within the organisation.

In addition to identifying the contribution that Statements 6, 7, 8 and 9 have on the credibility of a TQM training programme, the impact that the respective training approach has on the credibility of the TQM training programme was also analysed.

4.4.4 THE INFLUENCE THAT THE RESPECTIVE TRAINING APPROACH HAS ON THE CREDIBILITY OF A TQM TRAINING PROGRAMME

In this regard, Statements 21 to 40 were correlated with Statement 10 to identify which training approach makes the greatest contribution to the implementation of a TQM training programme (refer to **APPENDICES T and U** respectively). The credibility of a TQM training programme was found to be notably higher for those statements that characterised the Impact training approach (i.e. Statements 21, 27 and 29), as compared to those statements that characterised the Activity training approach (i.e. Statements 26 and 35).

4.5 TRAINING AND DEVELOPMENT

In addition to the analysis carried out in Section 4.4, two further aspects are reported upon that may influence the credibility of a TQM training programme: firstly, who is responsible for the various phases of a TQM training programme (Statements 13 to 20) and secondly, the training approach that is followed within the tested population (Statements 21 to 40) and the contribution thereof towards the successful implementation of a TQM training programme.

4.5.1 WHO IS RESPONSIBLE FOR THE VARIOUS PHASES OF A TQM TRAINING PROGRAMME?

Fifty-six percent (55.60%) of the respondents indicated that the responsibility for training staff on TQM techniques is allocated to the line manager (see **TABLE 4-10**).

TABLE 4-10: PERCENTAGE RESPONSE FOR WHO IS RESPONSIBLE FOR TRAINING STAFF ON TQM ASPECTS WITHIN THE SAMPLE POPULATION (STATEMENT 12)

STATEMENT:	STATEMENT 12 (option 1): Training officer	STATEMENT 12 (option 2): Line manager	STATEMENT 12 (option 3): Both
% RESPONSE:	5.85%	55.56%	38.59%

A comparison between Statements 12 and 13 to 20 were made to identify the importance that the line manager and/or the trainer plays in the various phases of a TQM training programme, namely, needs analysis, the design of the training programme, implementing the training programme and conducting the training evaluation (as shown in **TABLE 4-11**).

TABLE 4-11: PERCENTAGE RESPONSE RATE FOR STATEMENT 12 AS COMPARED WITH STATEMENTS 13 TO 20

STATEMENTS:	DESCRIPTION:	% RESPONSE FOR STATEMENT 12			TOTAL %
		Training officer	Line manager	Both	
STATEMENT 13	TQM training needs are diagnosed by:	19.88%	54.97%	25.15%	100%
STATEMENT 14	TQM training objectives are concluded by:	12.28%	61.40%	26.32%	100%
STATEMENT 15	The basic TQM programme design in decided upon by:	28.07%	50.87%	21.06%	100%
STATEMENT 16	Contents of the TQM programme is determined by:	19.29%	45.62%	35.09 %	100%
STATEMENT 17	Programme implementation decisions are taken by:	18.12%	56.14%	25.74%	100%
STATEMENT 18	Form of evaluation chosen by:	21.05%	48.54%	30.41%	100%
STATEMENT 19	When TQM skill transfer appears not to be occurring, who determines these problems?	17.54%	56.14%	26.32%	100%
STATEMENT 20	Who takes action to resolve these skills transfer problems?	12.28%	51.46%	36.26%	100%

The responses depicted in **TABLE 4-11** indicate that the responsibility for training staff on TQM aspects is either that of the line manager or the trainer, or alternatively a joint collaborative approach is followed in certain instances. The responses for Statement 12 were compared to Statements 13 to 20, and in turn compared with Statement 10 to identify whether a separate, or combined approach to training staff on TQM aspects make the greatest contribution towards the credibility of a TQM training programme (refer to **TABLE 4-12**).

TABLE 4-12: COMPARATIVE ANALYSIS BETWEEN STATEMENTS 10, 12, AND 13 TO 20

STATEMENTS:	DESCRIPTION:	OPTIONS:	STATEMENT 10 (option 1): TQM TRAINING PROGRAMMES LACK CREDIBILITY (% Response)	STATEMENT 10 (option 2): TQM TRAINING PROGRAMMES ARE CREDIBLE (% Response)
STATEMENT 13	TQM training needs are diagnosed by:	TRAINER	12.28%	7.60%
		LINE MANAGER	28.07%	26.90%
		BOTH	12.28%	12.86%
STATEMENT 14	The TQM training objectives are concluded by:	TRAINER	5.26%	7.01%
		LINE MANAGER	34.50%	26.90%
		BOTH	12.86%	13.45%
STATEMENT 15	The basic TQM programme design is decided upon by:	TRAINER	16.37%	11.69%
		LINE MANAGER	27.48%	23.39%
		BOTH	8.77%	12.28%
STATEMENT 16	The contents of the TQM training programme is determined by:	TRAINER	12.28%	7.01%
		LINE MANAGER	25.14%	19.88%
		BOTH	15.20%	20.46%
STATEMENT 17	Programme implementation decisions are taken by:	TRAINER	9.94%	8.18%
		LINE MANAGER	31.57%	24.56%
		BOTH	11.11%	14.61%
STATEMENT 18	The form of evaluation is chosen by:	TRAINER	13.45%	7.60%
		LINE MANAGER	28.07%	20.46%
		BOTH	11.11%	19.29%
STATEMENT 19	Who identifies TQM skill transfer problems?	TRAINER	11.69%	5.84%
		LINE MANAGER	32.74%	23.39%
		BOTH	8.18%	18.12%
STATEMENT 20	Who takes action to resolve these skill transfer problems?	TRAINER	8.18%	4.09%
		LINE MANAGER	31.37%	19.88%
		BOTH	12.86%	23.39%

As is evident in **TABLE 4-12**, the credibility of a TQM training programme is significantly higher in those instances were a collaborative approach between the line manager and the trainer existed during the implementation of the various phases of the training programme.

4.5.2 THE TRAINING APPROACH FOLLOWED WITHIN THE SAMPLE POPULATION (STATEMENTS 21 TO 40)

In this regard, the literature survey points to the use of both an Activity and/or an Impact training approach when implementing TQM training programmes. Three statements pertaining to the Impact training approach (i.e. Statements 21, 27 and 29) and two statements relating to the Activity training approach (Statements 26 and 35) are further analysed. (The percentage response rates for Statements 21 to 40 are shown in **APPENDIX V**.)

4.5.2.1 CONDUCTING A NEEDS ANALYSIS BEFORE IMPLEMENTING A TQM TRAINING PROGRAMME (STATEMENT 21)

A needs analysis phase is critical for the successful implementation of any training programme. Fifty-three percent (53.30%) of the respondents identified that a needs analysis was carried out prior to implementing TQM training programmes. The Chi-test statistical test was then used to determine whether a dependent or independent relationship exists between conducting a needs analysis before implementing a TQM training programme (Statement 21) and Statements 23, 24 and 30.

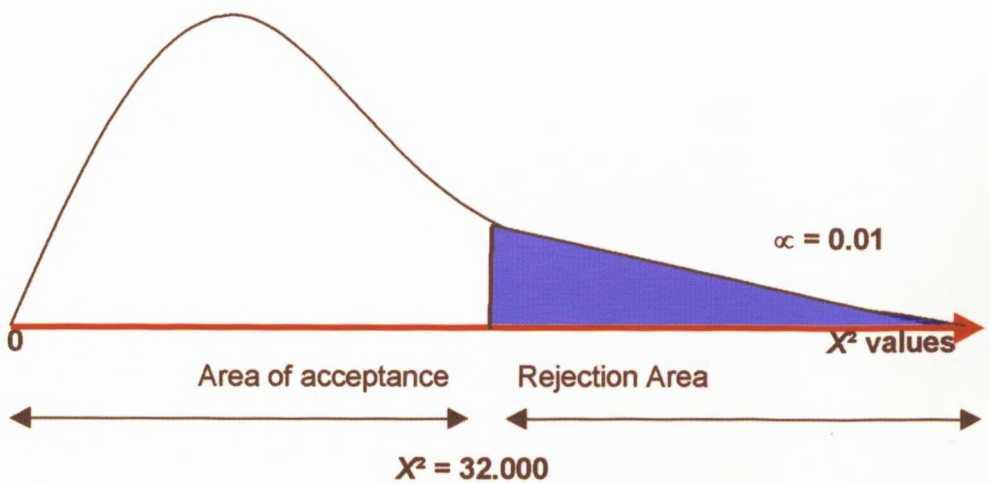
4.5.2.1 (a) THE RESULTS OF THE CHI-SQUARE STATISTICAL TEST FOR STATEMENTS 21 AND 23

The Chi-square statistical test was used to determine whether a dependent or independent relationship exists between conducting a needs analysis (Statement 21) and evaluating whether the trainees are applying on the job the TQM training skills learned (Statement 23). Refer to **TABLE 4-13** and **APPENDIX W**.

TABLE 4-13: RESULTS OF THE CHI-SQUARE STATISTIC FOR STATEMENTS 21 AND 23

CHI-SQUARE:	VALUE:	DF:	SIGNIFICANCE:
Pearson	71.07525	16	0.00000
Likelihood Ratio	62.85505	16	0.00000
Mantel-Haenszel test for linear association	37.47809	1	0.00000

Graphically:



The decision rule is:	Accept H_o	if $X^2 \leq 32.000$
	Reject H_o	if $X^2 > 32.000$
Therefore:	Reject H_o at the one percent level of significance.	

The Chi-square sample statistic ($\chi^2_{calc} = 71.07524$) lies outside the area of acceptance (i.e. more than $\chi^2 = 32.000$). At the one percent level of significance ($p \leq 0.01 = \alpha$) it may be concluded that Statements 21 and 23 are dependent at p=0.00000. Therefore, a very strong relationship exists between conducting a needs analysis before implementing a TQM training programme and evaluating whether the trainees are applying on the job the TQM skills learned.

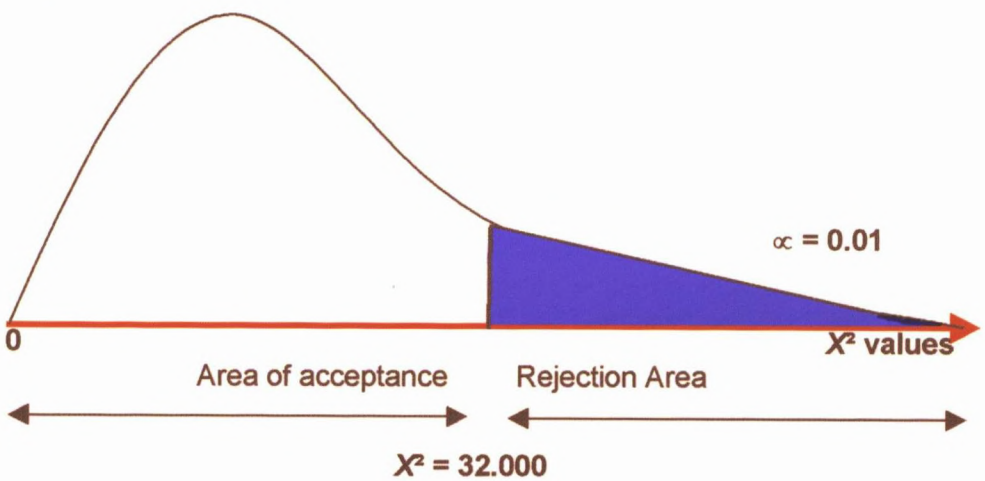
4.5.2.1 (b) THE RESULTS OF THE CHI-SQUARE STATISTICAL TEST FOR STATEMENTS 21 AND 24

The Chi-square test was used to analyse whether a dependent or independent relationship exists between conducting a needs analysis for a TQM training programme (Statement 21) and applying the TQM skills learned immediately after completion of the training programme (Statement 24). The results of the Chi-square statistical test for Statements 21 and 24 are depicted in **TABLE 4-14** and **APPENDIX X**.

TABLE 4-14: RESULTS OF THE CHI-SQUARE STATISTIC FOR STATEMENTS 21 AND 24

CHI-SQUARE:	VALUE:	DF:	SIGNIFICANCE:
Pearson	33.44787	16	0.00644
Likelihood Ratio	37.04187	16	0.00207
Mantel-Haenszel test for linear association	1.49513	1	0.22142

Graphically:



The decision rule is: Accept Ho if $X^2 \leq 32.000$

Reject Ho if $X^2 > 32.000$

Therefore: Reject Ho at the one percent level of significance.

The Chi-square sample statistic (χ^2calc = 33.44787) lies outside the area of acceptance (i.e. more than $\chi^2 = 32.000$). At the one percent level of significance ($p \leq 0.01 = \alpha$) it may be concluded that Statements 21 and 24 are dependent at p=0.00644. Therefore, a strong

association exists between conducting a needs analysis before implementing a TQM training programme and ensuring immediate application for the TQM skills learned.

4.5.2.1 (c) THE RESULTS OF THE CHI-SQUARE STATISTICAL TEST FOR STATEMENTS 21 AND 30

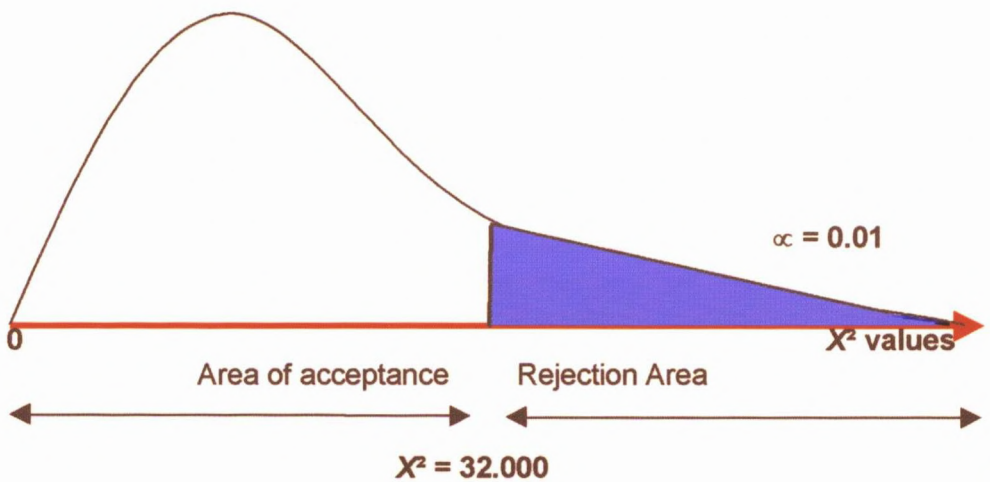
The information obtained during the needs analysis phase of the TQM training programme could provide the trainer with valuable information relating to the evaluation phase of the training programme. The Chi-square statistical test was used to determine whether a dependent or independent relationship exists between conducting a needs analysis prior to implementing a TQM training programme (Statement 21) and measuring the results of the training programme afterwards (Statement 30).

In **TABLE 4-15** and **APPENDIX Y**, the Chi-square sample statistic (χ^2_{calc} = 49.54879) lies outside the area of acceptance (i.e. more than χ^2 = 32.000). At the one percent level of significance ($p \leq 0.01 = \alpha$) it may be concluded that Statements 21 and 30 are dependent at p=0.00003. Therefore, a very strong association exists between conducting a needs analysis before implementing a TQM training programme and measuring the results of the TQM training programme afterwards.

TABLE 4-15: RESULTS OF THE CHI-SQUARE STATISTIC FOR STATEMENTS 21 AND 30

CHI-SQUARE:	VALUE:	DF:	SIGNIFICANCE:
Pearson	49.54879	16	0.00003
Likelihood Ratio	43.66237	16	0.00022
Mantel-Haenszel test for linear association	14.59065	1	0.00013

Graphically:



The decision rule is: Accept Ho if $X^2 \leq 32.000$

Reject Ho if $X^2 > 32.000$

Therefore: Reject Ho at the one percent level of significance.

4.5.2.2 THE PREPARATION OF THE WORK ENVIRONMENT TO SUPPORT THE TRAINEES' SKILLS ACQUIRED (STATEMENT 27)

An important element of the Impact training approach is that there should be a conducive work environment to ensure that knowledge and skills acquired during the TQM training programme are transferred back to the work place. Fifty-seven percent (57%) of the respondents indicated that in their organisations the work environment is conducive to this and are prepared to support the newly acquired knowledge and skills of the trainees once they return from the TQM training programme. The Chi-square statistical test was used to determine whether dependent of independent relationships exist between preparing the work environment so as to support the trainees' skills acquired (Statement 27) and Statements 26 and 33, i.e. the relevance of the TQM training programme to the trainees' work environment and the role of the line manager in preparing a conducive work environment for the transfer of training.

4.5.2.2 (a) THE RESULTS OF THE CHI-SQUARE STATISTICAL TEST FOR STATEMENTS 27 AND 26

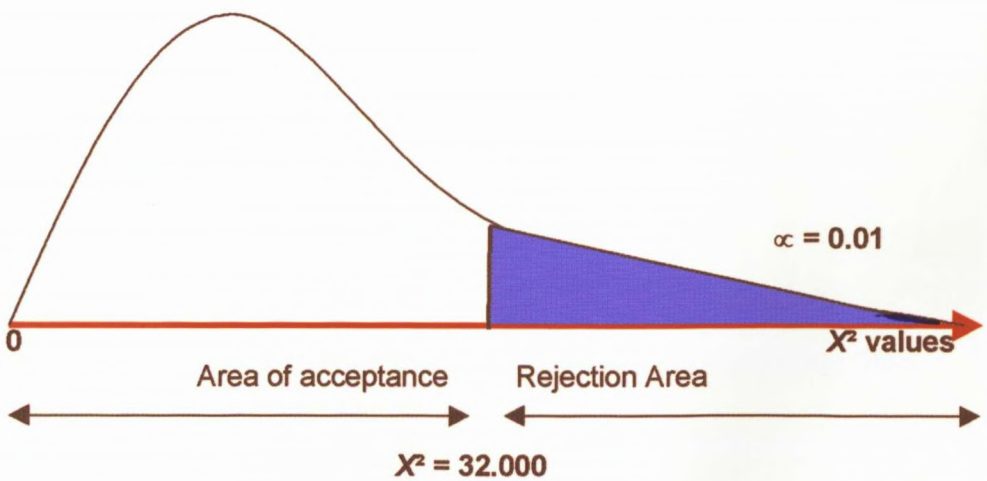
The Chi-square statistical test was used to determine whether an association exists between creating a work environment that is supportive of the training skills acquired (Statement 27) and whether trainees perceive TQM training as being irrelevant to their job functions (Statement 26).

As depicted in **TABLE 4-16** and **APPENDIX Z**, the Chi-square sample statistic (χ^2_{calc} = 35.82655) lies outside the area of acceptance (i.e. more than χ^2 = 32.000). At the one percent level of significance ($p \leq 0.01 = \alpha$) it may be concluded that Statements 27 and 26 are dependent at p=0.00306. Therefore, a strong association exists between the importance of a supportive work environment for trainees returning to their jobs and the perceived relevance of the TQM training programme.

TABLE 4-16: RESULTS OF THE CHI-SQUARE STATISTIC FOR STATEMENTS 27 AND 26

CHI-SQUARE:	VALUE:	DF:	SIGNIFICANCE:
Pearson	35.82655	16	0.00306
Likelihood Ratio	30.28383	16	0.01658
Mantel-Haenszel test for linear association	1.56469	1	0.21098

Graphically:



The decision rule is: Accept H_o if $X^2 \leq 32.000$

Reject H_o if $X^2 > 32.000$

Therefore: Reject H_o at the one percent level of significance.

4.5.2.2 (b) THE RESULTS OF THE CHI-SQUARE STATISTICAL TEST FOR STATEMENTS 27 AND 33

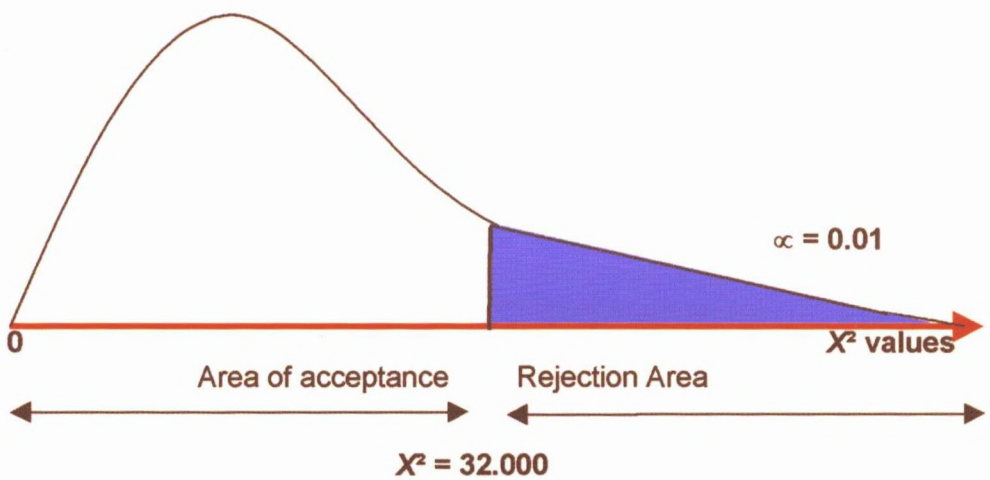
It is accepted that a supportive work environment can only be created with the assistance of the line manager. A comparison was made between Statements 27 and 33 to determine whether a dependent/independent relationship exists between creating a supportive working environment (Statement 27) and whether the line manager has a prominent role to play in assisting the trainer in this regard (Statement 33).

In **TABLE 4-17** and **APPENDIX AA**, the Chi-square sample statistic ($\chi^2_{calc} = 54.27143$) lies outside the area of acceptance (i.e. more than $\chi^2 = 32.000$). At the one percent level of significance ($p \leq 0.01 = \alpha$) it may be concluded that Statements 27 and 33 are dependent at $p = 0.00000$. Therefore, a very strong association exists between the importance of a supportive working environment for trainees returning to their jobs after a TQM training programme and the need for the line manager to assist the trainer in preparing a supportive working environment to support TQM training.

TABLE 4-17: RESULTS OF THE CHI-SQUARE STATISTIC FOR STATEMENTS 27 AND 33

CHI-SQUARE:	VALUE:	DF:	SIGNIFICANCE:
Pearson	54.27143	16	0.00000
Likelihood Ratio	49.68953	16	0.00003
Mantel-Haenszel test for linear association	28.34558	1	0.00000

Graphically:



The decision rule is: Accept Ho if $X^2 \leq 32.000$

Reject Ho if $X^2 > 32.000$

Therefore: Reject Ho at the one percent level of significance.

4.5.2.3 THE BENEFITS OF TQM TRAINING ARE ASSESSED IN THE LIGHT OF ITS OVERALL CONTRIBUTION TO THE ORGANISATION (STATEMENT 29)

The literature review identifies the need of aligning TQM training programmes with the overall business needs of the organisation and to assess the contribution that TQM training programmes make towards the objectives/goals of the organisation. Fifty-nine percent (59%) of the respondents indicated that in their respective organisations the value of TQM training programmes are assessed in the light of its overall contribution to the organisation (Statement 29). In order to amplify on the training approach followed within the sample tested, Chi-square was calculated for Statement 29 when compared to Statements 35 and 36, which relates to whether the trainees accomplished the objectives of the TQM training programme and whether the return on TQM training investments justify its expenditure.

4.5.2.3 (a) THE RESULTS OF THE CHI-SQUARE STATISTICAL TEST FOR STATEMENTS 29 AND 35

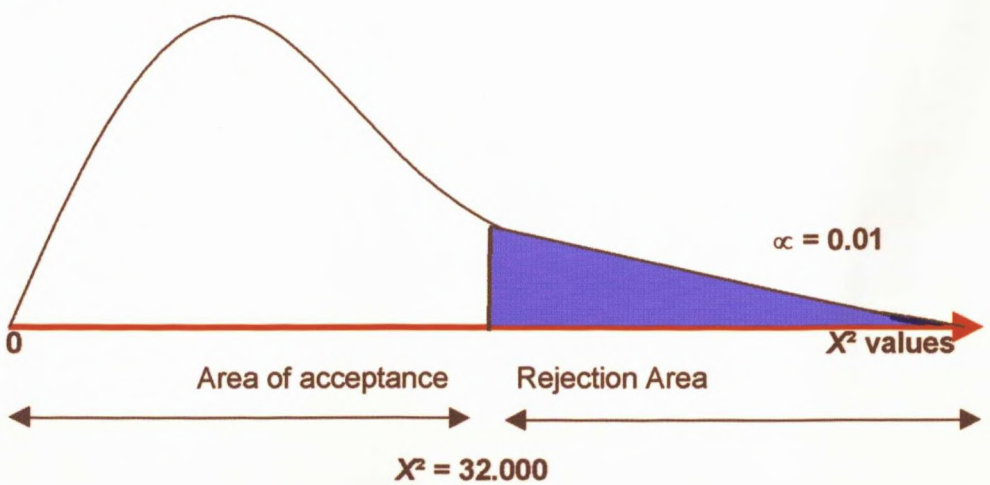
The Chi-square statistical testl was used to determine whether a dependent or independent relationship exists between assessing the contribution that TQM training makes towards the organisation (Statement 29) and the need for the trainer to determine whether the trainees have acquired the specified knowledge and skills during the TQM training programme (Statement 35).

As depicted in **TABLE 4-18** and **APPENDIX AB**, the Chi-square sample statistic (χ^2_{calc} = 42.92716) lies outside the area of acceptance (i.e. more than χ^2 = 32.000). At the one percent level of significance ($p \leq 0.01 = \alpha$) it may be concluded that Statements 29 and 35 are dependent at p=0.00029. Therefore, a very strong association exists between assessing the contribution that TQM training makes towards the organisation and the need for the trainer to determine whether the trainees have acquired the knowledge and skills that were identified before implementing the TQM training programme.

TABLE 4-18: RESULTS OF THE CHI-SQUARE STATISTIC FOR STATEMENTS 29 AND 35

CHI-SQUARE:	VALUE:	DF:	SIGNIFICANCE:
Pearson	42.92716	16	0.00029
Likelihood Ratio	38.10906	16	0.00146
Mantel-Haenszel test for linear association	18.01022	1	0.00002

Graphically:



The decision rule is: Accept H_o if $X^2 \leq 32.000$

Reject H_o if $X^2 > 32.000$

Therefore: Reject H_o at the one percent level of significance.

4.5.2.3 (b) THE RESULTS OF THE CHI-SQUARE STATISTICAL TEST FOR STATEMENTS 29 AND 36

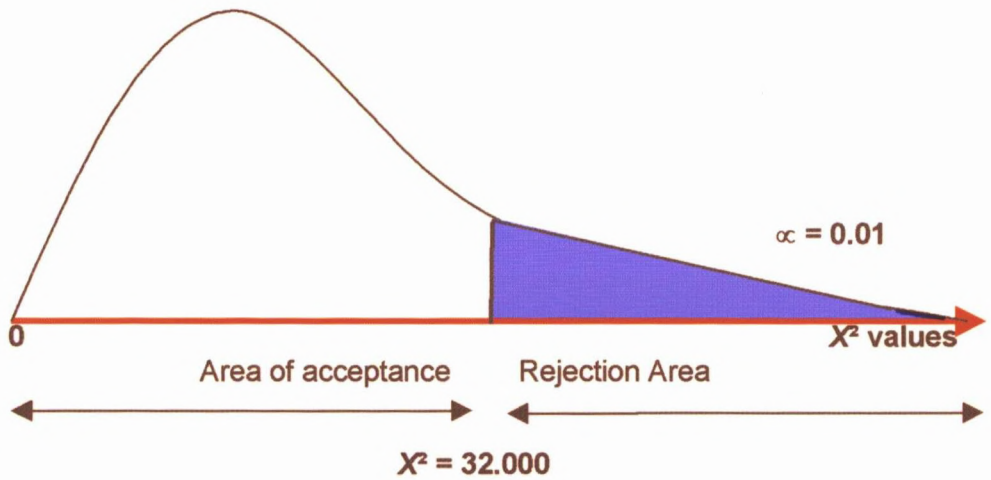
It is accepted that organisations expect their Training and Development departments to justify the TQM training expenditure and to prove that these investments contribute towards the objectives of the organisation. The Chi-square statistical test was used to determine whether a dependent or independent relationship exists between assessing the contribution that TQM training programmes make towards the organisation (Statement 29) and whether the return on TQM training investments justify its expenditure (Statement 36).

As shown in **TABLE 4-19** and **APPENDIX AC**, the Chi-square sample statistic (χ^2_{calc} = 57.50551) lies outside the area of acceptance (i.e. more than χ^2 = 32.000). At the one percent level of significance ($p \leq 0.01 = \alpha$) it may be concluded that Statements 29 and 36 are dependent at p=0.00000. Therefore, a very strong association exists between assessing the contribution that TQM training makes towards the organisation and ensuring that the returns on TQM training investments justify its expenditure.

TABLE 4-19: RESULTS OF THE CHI-SQUARE STATISTIC FOR STATEMENTS 29 AND 36

CHI-SQUARE:	VALUE:	DF:	SIGNIFICANCE:
Pearson	57.50551	16	0.00000
Likelihood Ratio	56.51587	16	0.00000
Mantel-Haenszel test for linear association	21.72345	1	0.00000

Graphically:



The decision rule is: Accept Ho if $X^2 \leq 32.000$

Reject Ho if $X^2 > 32.000$

Therefore: Reject Ho at the one percent level of significance.

4.6 CONCLUDING REMARKS

The results obtained from the research survey identified the key biographical details of the sample population, the variables that impact on the credibility of a TQM training

programme, and whether the tested population follows the Activity or the Impact training approach when implementing TQM training programmes. A discussion on the results follows in Chapter five.

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CHAPTER FIVE

DISCUSSION

5.1 INTRODUCTION

In this section, key biographical characteristics and the three hypotheses are discussed with a view to establishing which training approach is better suited to the successful implementation of a TQM strategy.

5.2 THE CHARACTERISTICS OF THE SAMPLE POPULATION

The key biographical detail obtained from the tested population tends to suggest that approximately 43 percent of business are conducted at regional level and 42 percent at a national level. Only 15 percent of the respondents indicated that they also conduct their business internationally.

In an attempt to adhere to national, as well as international quality standards, South African food manufacturing organisations tend to emphasise the importance of quality processes and procedures within the industry. These quality processes and procedures are usually instilled in an organisation by means of a comprehensive TQM training, which may either follow an Activity or Impact training approach (Robinson and Robinson, 1989:6-11).

It should be kept in mind that a number of factors impact on the success of a TQM training programme, whether the training methodology used is an Activity or an Impact training approach. These factors are discussed below with a view to establishing their influence on a TQM training programme. At the same time a cursory examination is provided as to the influence of these factors on either of the two methodologies being tested, i.e. the Activity and Impact training approaches.

5.3 FACTORS THAT MAY INFLUENCE THE SUCCESSFUL IMPLEMENTATION OF TQM TRAINING PROGRAMMES

- The contribution of Quality Circle programmes,
- The length of time that TQM has been implemented in an organisation,
- Who has been responsible for the design of the TQM strategy, and
- Who is responsible to communicate the TQM changes within the organisation.

The research survey investigated whether these four factors (identified in the literature reviewed) influence the successful implementation of TQM training programmes by means of contributing towards, or inhibiting, the credibility of such a training programme. If a TQM training is viewed as credible, it will better the chances of the Training and Development department implementing a TQM training programme that is more reputable, acceptable

and trustworthy in ensuring that the quality objectives identified by management will be attained (Robinson, et al, 1989:5-9).

5.3.1 THE CONTRIBUTION THAT QUALITY CIRCLES MAKE TOWARDS THE CREDIBILITY OF TQM TRAINING PROGRAMMES

Sixty-one percent (61%) of the respondents that participated in the survey reported that Quality Circles were introduced prior to, or simultaneously with the implementation of TQM training programmes. Thirty-five percent (35%) of these respondents reported that the credibility of the TQM training programmes offered in their organisations were notably higher than the 16 percent of respondents who had not introduced Quality Circles. Similar findings are reported by other authors such as Tunks (1992:153-157), Carter (1994:12-14), and Waller, Allen and Burns (1994:57), who suggests that implementing Quality Circle programmes as a forerunner to TQM, will enhance the acceptance and credibility of TQM amongst employees and line management.

Despite the above statement, 52 percent of the respondents reported that TQM training programmes lacked credibility within their organisations and of this a further 26 percent indicated that a lack of credibility is experienced irrespective as to whether Quality Circles are presently, or have been phased out. The inability of these Quality Circle programmes to contribute to the credibility of TQM training programmes may be due to various reasons. According to Bessant (1991:254-255) and Tayeb (1996:199), major contributing factors to the failure of Quality Circle programmes are the lack of extensive training, education,

development and teambuilding, which is needed to prepare employees for purposeful participation in Quality Circle programmes.

Based on these findings, it is concluded that Quality Circle programmes can make an important contribution towards the credibility of TQM training programmes. However, the findings also suggest that the implementation of Quality Circle programmes should be combined with the continuous reinforcement of training, development, and teambuilding, which are required to sustain the TQM programme in an organisation.

5.3.2 THE CONTRIBUTION THAT THE TQM IMPLEMENTATION PERIOD MAKES TOWARDS THE CREDIBILITY OF TQM TRAINING PROGRAMMES

Sixty-seven percent (67%) of the sample population reported that TQM has been in operation at their organisations for two to five years, which may be attributed to South African organisations re-entering into international markets since 1993 (Russ Russo, 1998). A paradigm shift of this nature have emphasised the need for South African food manufacturing organisations to implement TQM to achieve and maintain quality standards (Carruthers, 1996; Du Plessis, 1996; HRM, 1996).

The research revealed that at the one percent level of significance, a dependent relationship exist at p=0.00745, between the length of time that TQM has been in operation in an organisation and the credibility of the TQM training programmes. These findings are supported by the writings of Ciampa (1992:186-188), Kearney (1992) and Stewart

(1994:65-66), who note that during the initial stages of TQM implementation, both employees and management see TQM training programmes largely in a positive light, because of the possibility of resolving the company's quality problems. However, Harrington (1987:80-84) comments that when TQM training fail to deliver the long-awaited results, enthusiasm often dwindles, resulting in a perceived lack of credibility for the TQM training programmes. Therefore, it may be concluded that the credibility of a TQM training programme is dependent upon the length of time TQM has been implemented in an organisation.

5.3.3 THE CONTRIBUTION THAT THE DESIGN OF THE TQM STRATEGY MAKES TOWARDS THE CREDIBILITY OF TQM TRAINING PROGRAMMES

According to Townley (1995:614-618) the credibility of TQM training programmes often decline over the long term (three to five years), because senior management allocates the responsibility for TQM training programmes to the line managers, who often perceive TQM training as merely another burden to their existing job load. Hubiak and O'Donnell (1996) have found that under these circumstances, the initial enthusiasm and commitment towards the TQM training programme declines, which may lead to the failure of TQM training programmes (Kearney, 1992; Poe and Courter, 1992). Therefore, if managerial participation is encouraged during the design and implementation phases of TQM, it may ultimately increase the credibility of the TQM training programmes offered in the organisation. Participation with lower levels of managerial staff results in them accepting ownership for

the TQM strategy and hence encourages them to share in the responsibility of TQM training programmes.

No significant relationship was found to exist between the credibility of TQM training programmes and who had designed the TQM strategy (p=0.21977), which indicates that the sample population does not attach importance to who designs the TQM strategy. However, a comparative analysis was conducted to determine whether a trend could be noted for the credibility of a TQM training programme, the design of the TQM strategy and the length of time that TQM has been in operation in an organisation.

It was found that where an organisation followed a TQM strategy for less than three years, the credibility of TQM training programmes were eminently higher, particularly if the TQM strategy had been designed by management and/or a consultant. However, in those instances were TQM had been implemented for three to five years, the TQM training programme are reported to be less credible, irrespective who had designed the TQM strategy. Similar findings are reported by Tunks (1992:100-102), who states that active participation from top and middle management during the initial phases of TQM (such as the design of the TQM strategy), could increase the credibility of TQM training programmes.

5.3.4 WHO IS RESPONSIBLE TO COMMUNICATE THE TQM CHANGES IN AN ORGANISATION?

Ninety percent (90%) of the respondents indicated that the line manager is responsible for communicating TQM changes within an organisation. Similarly, Fenton (1998) has found

that line managers are generally considered responsible for their staffs' ability to adapt to changes in the organisation.

Also evident from the research results is that the person communicating TQM changes within an organisation impacts on the credibility of the TQM training programmes. This dependent relationship that exist at the five percent level of significance at p=0.0101771, corresponds with a study conducted by Parsloe (1980), who concluded that if the line manager is committed towards a cause, it stimulates greater commitment from employees. Therefore, if the line manager actively communicates, supports and reinforces TQM changes in their departments, employees will view TQM training as being both important and credible towards implementing and maintaining the quality change efforts identified by management.

Robinson and Robinson (1989:5-15) suggest that the credibility of TQM training programmes could only be increased, if the responsibility for communicating TQM changes is shared by the line manager and the trainer/Training and Development department, which is evidently not the case within the sample population. Robinsons (1989) add that such a collaborative approach (which they describe as the Impact training approach) should also be undertaken for the four phases of a training programme, i.e. needs analysis, design, implementation and evaluation. When these four training phases enjoyed joint involvement by the line managers and trainers, the credibility of TQM training programmes were notably higher as evident by 35 percent responding as such. In comparison, when there was little involvement/ no involvement in these four training phases, it became evident that the

credibility of such TQM training programmes suffered, as was evident from the 61 percent of the respondents who reported as such.

From these findings, it may be concluded that the test sample follows an Activity training approach, as compared to the Impact training approach. This conclusion is affirmed by a 90 percent favourable response rate obtained from the respondents, who reported that the line manager is responsible for communicating TQM changes within the organisation. This clearly indicates an absence of a collaborative approach, which is the foundation of the Impact training methodology.

5.3.5 CONCLUSIONS IN RESPECT OF THE "CREDIBILITY OF TQM TRAINING PROGRAMMES"

It is concluded from the four points presented earlier, that the credibility of a TQM training programmes is dependent upon three factors: firstly, whether or not Quality Circles were implemented prior to, or simultaneously with the TQM training programme, secondly, the length of time that TQM has been in operation at an organisation, and thirdly, the person who communicates TQM changes in the organisation.

In addition to these factors, the study of the South African food manufacturing industry indicates that TQM training programmes lack credibility with both management and employees alike and that the credibility of a TQM training programme is much higher when the Impact training approach is used versus an Activity training approach.

5.4 THE HYPOTHESIS

A discussion on the results obtained for each of the hypotheses now follows:

5.4.1 HYPOTHESES ONE: THE ACTIVITY TRAINING APPROACH FAILS TO CONTRIBUTE TO THE SUCCESSFUL IMPLEMENTATION OF A TQM TRAINING PROGRAMME

Robinson et al (1989:6-12) identified five significant characteristics that describes the Activity training approach, i.e.:

- The Training Department is responsible for training and development, but not for the results obtained;

- The Training and Development staff is only accountable for the design and delivery phases of the training programmes, and not for the needs analysis and evaluation phases;

- The trainees experience an absence of skill transfer from the classroom to the work environment;

- The Training and Development department fails to align the training and development goals with the overall business needs of the organisation; and

- There is a lack of identified management responsibilities for the outcome/ results of the training programmes.

In the study only one characteristic became evident, namely the absence of skills transfer from the classroom to the job.

Under the Activity training approach, it is the line manager's responsibility to ensure that the trainees apply the knowledge and skills gained during the TQM training programme. The literature review suggests certain guidelines that organisations could use to facilitate the transfer of skills from the classroom to the work environment (see Laird, 1985:272-275; Van Ments, 1990:11; Broad and Newstrom, 1992:19; Tracey, 1992:456-460; Gouch, 1996:26-29; Jones, 1996:96-97; Kirkpatrick, 1996:20-25; and Goleman, 1998:244-250). The test sample report that some of these guidelines are being implemented within their organisations, as is evident by the following responses:

- Forty-six percent (46%) stated that the trainer evaluates whether the trainees are applying on the job the TQM skills learned;

- Forty-seven percent (47%) of the respondents indicated that they perceive the contents of the TQM training programme to be practical;

- Fifty-nine percent (59%) reported that their line managers coaches on-the-job once they return from the TQM training programme; and

- Sixty-five percent (65%) of the respondents state that they have immediate application for the TQM skills learned during the TQM training programme.

However, according to Broad and Newstrom (1992:20, 23, 107), insufficient feedback and the lack of authority given to trainees to exercise their newly acquired skills on-the-job, greatly constrain the transfer of training skills from the classroom to the work environment. Forty-five percent (45%) of the test sample, who responded as compared to those who did not respond, indicated that they receive little, if any, feedback on the use of their newly acquired skills, and 40 percent reported that they experienced a lack of authority to use their knowledge and skills on-the-job. Peters (1987:310) and Tunks (1992:88,193) warn that this reported lack of feedback and authority in the work environment jeopardises the success of TQM training programmes.

In regard to the reported lack of feedback, Tunks (1992: 186-187) has found that employees who receive irregular feedback are more demotivated and lack commitment towards TQM. However, according to Koontz, O'Donnell and Weihrich (1986:420-423), recommends continuous feedback, to constantly reinforce the required behavioural changes that the TQM training programmes set out to accomplish. Such reinforcement and/ or feedback to ensure positive behaviour should occur in a supportive work environment that encourages participation and allows for the empowerment of the trainees (Newstrom and Lengnick-Hall, 1991).

However, participation and empowerment requires a very special manager-subordinate relationship, which Mullins (1996:570) believes can only be accomplished by implementing

a democratic leadership style that emphasises the value of delegating authority and responsibility to employees. Tunks (1992:236) agrees with Mullins and has found that "autocratic styles of management are incompatible with successful TQM because TQM requires participation from all employees at all levels".

These findings suggests that in order for TQM knowledge and skills to be transferred from the classroom to the work environment, the following elements are critical: (1) line managers must be able to coach on-the-job, and (2) that trainees should be able to immediately apply the TQM skills learned. These elements were not clearly articulated in the responses obtained from the test sample, and may suggest that an absence of skill transfer is being experienced. Therefore, it is concluded that the research findings support the first hypothesis, namely that the Activity training approach fails to contribute to the successful implementation of TQM training programmes, because a lack of feedback, reinforcement and authority to use the newly acquired skills were reported by the respondents.

5.4.2 HYPOTHESIS TWO: THE IMPACT TRAINING APPROACH CONTRIBUTES TO THE SUCCESSFUL IMPLEMENTATION OF A TQM PROGRAMME

The five characteristics that distinguish the Impact training approach were clearly identified in this study and are discussed below.

5.4.2.1 ESTABLISHING A PARTNERSHIP BETWEEN THE HUMAN RESOURCES STAFF (TRAINING AND DEVELOPMENT DEPARTMENT) AND THE CLIENT

An important characteristic of the Impact training approach is the need for an interdependent relationship to be established between the Human Resources/ Training and Development Department and the client, i.e. the line manager. Fifty-four percent (54%) of the respondents indicated that in their organisations the Training and Development department has established a partnership with line management.

The contribution that a partnership between the Training and Development Department and the line manager can make towards the successful implementation of TQM training programmes is recognised by various authors, such as Schuler (1990), Olian, and Rynes (1991), Schmidt and Finnegan (1993:66-75), Kamoche (1994), and Jeffries, Evans and Reynolds (1996:55-60). Tunks (1992:227) regards the establishment of such a partnership as a "participatory decision making" process, where the trainer and the line manager shares ideas, suggestions and concerns relating to the TQM training programmes offered in the organisation. Tunks (1992:176-178) concludes that if the trainer encourages participation from line management, he/she is possibly preparing the groundwork for the successful implementation of the TQM training programmes, by means of encouraging management to support, accept and commit towards TQM.

5.4.2.2 TRAINING IS LINKED TO BUSINESS NEEDS

The Impact training approach recognises the need for training to be linked to business needs. Wexley and Latham (1985:22-23) warn that if training is to be linked to business needs, the association must be established early in the training process, to ensure that from the outset the training programmes offered will be needs-driven. This means that the Human Resources/ Training and Development Department must respond to needs as they arise. Hence, the importance of needs analysis is firmly entrenched in the Impact training approach.

Several authors propagate the important role that a systematic needs analysis exercise plays in ensuring the successful implementation of TQM training programmes (see Oppenheimer, 1985:45; Latham, 1988; Svenson and Rindered, 1992:184; Greenwood, Wasson and Giles, 1993; and Dalziel, 1994:145-146). Craig (1987:17-20) and Peters (1994:228-230) are of the opinion that the needs analysis phase is the first step to realising the main objective of TQM training programmes, namely, to equip employees with knowledge and skills, which should be applied on-the-job as to ensure quality processes and procedures. However, Rothwell (1996:42-44) adds that in order for a needs analysis to be effective and to contribute to the successful implementation of TQM training programmes, the Training and Development department should continuously re-evaluate employees' training needs, monitor on-the-job application thereof, and adjust the content and design of the TQM training programmes accordingly.

The findings obtained from the research survey supports these suggestions made by the various authors. At the one percent level of significance a very strong association (p=0.00000) exists between conducting a needs analysis prior to implementing a TQM training programme and evaluating whether the trainees are applying on-the-job the TQM skills learned. In addition, 53 percent of the respondents indicated that a needs analysis is conducted prior to implementing TQM training programmes and 46 percent reported that the trainer does conduct an evaluation to determine whether the trainees are applying on-the-job the TQM skills learned. These findings reinforce two points: firstly, the importance of the needs analysis phase when implementing a TQM training programme and, secondly, that the application of the knowledge and skills gained during the training programme are dependent on whether or not a needs analysis was conducted prior to designing the programme's content.

Research conducted by Van Ments (1990:11), Garavaglia (1993) and Jones (1996:96-97) suggests that in order to reinforce the changed behaviour(s) that the TQM training programme has set out to achieve the newly acquired knowledge and skills should be applied immediately. In this regard, the research survey found that a very strong association existed at the one percent level of significance (p=0.00644) between conducting a needs analysis prior to implementing a TQM training programme and ensuring the immediate application of the TQM skills acquired. The majority of the tested sample (65.50 percent) indicated that the trainees do have immediate application for the TQM skills learned. In providing immediate application for the TQM skills learned, the Training and Development department would be able to assess the performance effectiveness of the

TQM training programme and determine whether the contents of the training programme are aligned with the business needs of the organisation.

5.4.2.3 ASSESSMENT OF PERFORMANCE EFFECTIVENESS

The Impact training approach emphasises that the training intervention should be assessed, not only in terms of the contribution thereof to the organisation, but also the quality of the trainees' performance. Various authors are of the opinion that performance effectiveness could only be determined if the trainer evaluates whether the trainees have acquired the TQM knowledge and skills during the training programme (see McCord, 1987:364; DuBois, 1993:240-245; Betts, 1994:251-255; Kirkpatrick, 1996:50-52; and Rothwell, 1996:287-289).

Rothwell and Kazanas (1995b:240-242) recommend that when determining trainees' performance effectiveness it is beneficial to evaluate at the second and third levels of Kirkpatrick's Evaluation Model (i.e. learning and behaviour evaluation). Then the trainer would most likely be able to assess more accurately to what extent the objectives of the TQM training programme have been learned and therefore provide the line manager with more sound feedback on the knowledge and skills mastered by the trainees. Similarly, Parry (1994:33) agrees that the trainer should provide the line manager with regular feedback in regard to the TQM training programme. Regular feedback also causes the line manager to realise that he has a role to play when the trainees return to the work environment, i.e. being their coach back on-the-job (Juechter, Fisher and Denison, 1998). Regular feedback will provide the trainer with the opportunity to establish a partnership with

the line manager in regard to evaluating the performance effectiveness of the trainees (Ullius and Milano, 1998).

Although 45 percent of the sample tested indicated that the trainer determines whether the trainees have learned the TQM knowledge and skills, 49 percent of the respondents are of the opinion that the trainer fails to provide regular reports regarding the TQM training programme and trainees progress to the line manager. This draws us to the conclusion that if TQM training programmes are to be successful then line managers should be brought into the communication loop and kept abreast of progress from the start of the programme until its completion.

5.4.2.4 MEASUREMENT OF RESULTS

The effect of a training programme on the bottom line results of an organisation can be measured by means of what Kirkpatrick calls the Results Evaluation (Fitz-enz, 1993:209; Harari, 1995:62; Hassett, 1995:299-304). The literature survey indicates that organisations are generally reluctant to use results evaluation, because it if often perceived to be a difficult form of evaluation (Buckley and Caple, 1992:22; Sonnenfeld and Ingols, 1994:91-92; Kirkpatrick, 1996:63-64; Schandler, 1996:93-94).

This is further supported by recent research conducted by Bassi and Van Buren (1999) for the American Society for Training and Development (ASTD), covering a four-year period (1994 to 1997). Their findings revealed that 89 percent of the organisations used reaction evaluation (level one), 29 percent collected data on learning evaluation (level two) and 11

percent collected data relating to behaviour evaluation (level three). However, only 2 percent of the organisations conducted results evaluation (level four).

Almost 60 percent of the tested sample indicated that the benefits (outcomes/results) of a TQM training programme are measured at their organisations. However, recent research papers warn that merely conducting results evaluation is not enough. Researchers recommend that levels two, three and four of Kirkpatrick's evaluation model should be conducted as a continuum (as stated by Brinkerhoff, 1998; King, 1998; Russ-Eft, Redding and Phelon, 1998; Stone, Harrel, Hodges, Schriver and Wurtz, 1998; and Zigon, 1998).

Similar findings are reported in the research conducted within the tested sample, which revealed that at the one percent level of significance a very strong association existed at $p=0.00029$ between assessing the contribution that TQM training makes towards the organisation and the need for the trainer to determine whether the trainees have learned the objectives of the TQM training programme (i.e. levels two and three of Kirkpatrick's evaluation model – as discussed in Section 5.4.2.3). By evaluating TQM training programmes at all four levels of evaluation, this will allow the Training and Development department to ensure the successful implementation of the programme. Future re-runs of the same training programme can be adjusted accordingly.

However, Bennabou (1996) and Merrick (1997) state that in assessing the contribution that TQM training programmes make towards the organisation, the Training and Development Department should also determine whether the return on TQM training investments justify its expenditure. Training and development is often viewed as a costly undertaking (Faidley,

1993; Huysamen, 1995), and therefore management teams are increasingly demanding results as to see whether or not the organisation is reaping the benefits from the money invested in these TQM training programmes.

The results obtained from the research supports the suggestions of Bennabou and Merrick. A very strong association was found to exist at the one percent level of significance (p=0.00000) between assessing the contribution that TQM training makes towards the organisation and ensuring that the returns on TQM training programmes justify its expenditure. In addition, 59 percent of the tested sample were of the opinion that in their organisation the return on TQM training programmes actually justifies the expenditure on these training programmes.

However, according to Abernathy (1999), not only should the expenditure on the TQM training programme be justified, but also the time, money, and effort spend on conducting the evaluation process. Abernathy (1999:23) is of the opinion that "the main approach to evaluation should be (to determine) what internal customers want to know about training, (and then the trainer should) collect the data that will answer (these) questions." However, when measuring/evaluating a training programme, the information obtained should be relevant to enable the trainer to determine future training needs in the organisation. Bernthal (1995) and Chaddock (1995) are of the opinion that to ensure that the measurement of a training programme is relevant, a holistic approach should be followed throughout all the phases of a TQM training programme.

Booher (1998) and Ogun (1998) agrees with Bernthal (1995) and Chaddock (1995), but notes that the various training phases could only be interrelated if a thorough needs analysis is conducted prior to implementing the TQM training programme. McWilliams and Philiips (1998) conclude that if the needs analysis phase is properly conducted, it may be a valuable source of information to the trainer when determining which aspects of the TQM training programme should be measured/evaluated as to save time and avoid duplication. In support of this, the research findings also found that at the one percent level of significance (p=0.00003) a strong association exist between measuring the results of a TQM training programme and conducting a needs analysis prior to implementing a TQM training programme.

Therefore, it is concluded that measuring the results of a TQM training programme is dependent upon certain factors, i.e. conducting levels two, three and four of Kirkpatrick's evaluation model, determining whether the TQM training programme justifies its expenditure, and carrying out a detailed needs analysis prior to implementing the TQM training programme to ensure the successful implementation of such a programme.

5.4.2.5 PREPARATION OF THE WORK ENVIRONMENT TO SUPPORT TRAINING

The Impact training approach views individual development as a continuous learning process. According to Camp, Blanchard and Huszczo (1986:334) a continuous learning environment could only be established if the trainees return to a supportive/conducive work environment. Fifty-seven percent (57%) of the sample tested indicated that the physical

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work environment supports the TQM skills learned. It may be concluded from these responses that organisations' operating within the South African food manufacturing industry regards a continuous learning environment as being important.

Robinson et al (1989:255-279) states that continuous learning could only be achieved by means of joint collaboration between the trainer and the line manager. Hence, the line manager should assist the trainer in preparing a conducive work/learning environment that will support the trainees' knowledge and skills acquired during the TQM training programme. The important role of the line manager is reinforced by the strong association that was found to exist at the one percent level of significance ($p=0.00000$), between the importance of establishing a supportive work environment for when the trainees return to their jobs after the TQM training programme and the need for the line manager to assist the trainer in this regard.

Research conducted by Lim (1998) and Paxton (1998) suggest that in assisting the trainer in preparing a conducive learning/work environment, the line manager can also guide the trainer as to ensure that the TQM training programmes offered will be relevant and practical. Forty-six percent (46%) of the respondents stated that TQM training programmes offered within their organisations are relevant to their jobs and 47 percent regarded the TQM training programmes to be practical. These figures are very similar to that of 48 percent of the respondents who indicated that the line managers do assist the trainer in preparing the work environment for when the trainees return from the TQM training programme.

The results of this research tend to indicate that all the characteristics that depict the Impact training approach are implemented by organisations operating in the South African food manufacturing industry, and therefore the second hypothesis is accepted.

In addition to the above observations, the following conclusions can be drawn:

- Although the Training and Development department reportedly establish a partnership between the trainer and the line manager, the tested sample reports that the trainer fails to provide the line manager with regular reports in regard to the progress of the TQM training programme and its participants. From this, it may be concluded that this could be a hampering factor in ensuring the successful implementation of the TQM training programmes in the studied industry.

- Based on the findings of the research survey it is concluded that conducting a needs analysis prior to implementing a TQM training programme, have three distinct advantages, namely:

  - The trainer can determine more accurately whether, or not, the trainees are applying on-the-job the TQM skills learned.

  - The trainer is able to identify whether or not the trainees will have immediate application for the TQM skills learned when they return to the work environment.

- The trainer obtains relevant information during the needs analysis phase, which could be used to measure the results of a TQM training programme (i.e. conducting results or level four evaluation).

- The research revealed that measuring the contribution of TQM training programmes (i.e. level four evaluation), is dependent upon two factors, namely: whether the trainees have acquired the TQM knowledge and skills during the training programme (i.e. whether learning and behaviour evaluation is conducted), and if the TQM training programme justify its expenditure. Hence, it is concluded that results or level four evaluation should be conducted jointly with learning and behaviour evaluation.

- The research found that establishing a supportive work environment that is conducive to continuous learning is dependent upon the assistance of the line manager. Therefore, the line manager should be regarded as an extension of the trainer and should participate actively in preparing a conducive work environment, which will facilitate the trainees' transfer of knowledge and skills.

5.4.3 HYPOTHESIS THREE: THERE IS NO RELATIONSHIP BETWEEN THE ACTIVITY AND IMPACT TRAINING APPROACHES

Although both approaches allow the organisation to achieve the desired results, the contribution that these training approaches make towards the successful implementation of a TQM training programme is totally different. The Activity training approach is confined to

the results obtained during a single training programme, whereas the Impact training tend to emphasise how training results can contribute to the organisation achieving its quality expectations. When the Impact training approach is used, this is reflected by the joint effort between the trainer/Training and Development department and the line manager, as compared to the Activity training approach which is characterised by a lack of joint responsibility between these two parties for the four phases of a training programme.

When considering the different outcomes and the opposite nature of Activity and Impact training, no relationship could be found to exist between these two training approaches, which suggests that the third hypothesis is accepted.

5.5 CONCLUDING REMARKS

Based on the results obtained from the research survey it is concluded that all three hypotheses are accepted: The Activity training approach fails to contribute towards the successful implementation of a TQM training programme (hypothesis one), whereas the Impact training approach brings about results-orientated training that ensures that the organisation training needs are met (hypothesis two), while no relationship was found to exist between these two training approaches (hypothesis three).

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CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 INTRODUCTION

It is apparent from this research that the two different training methodologies researched, i.e. the Activity and Impact training approaches, have its own strengths and weaknesses and each contribute to the TQM strategy differently.

What has become evident from the research is that TQM training programmes require a joint-effort from the learner/trainee, the trainer/Training and Development Department, and the line manager. The Impact training approach bears out these characteristics, which are evident in the research. In comparison the Activity training approach is a useful methodology for the trainer who has to conduct training programmes in a work environment where he/she gets very little support, but is still expected, none the less, to deliver training programmes. While attempting to find an approach that works better, many organisations are still using the characteristics that are pertinent to both the Activity and Impact training approaches, which has been amplified in this research and the literature reviewed.

6.2 RECOMMENDATIONS

It is recommended that if an organisation wants to pursue a successful TQM training programme, the following should be considered:

- Quality Circles should be used to prepare the groundwork for implementing TQM training programmes.

- Feedback should be an important feature when implementing TQM training programmes.

- The needs analysis phase of a training programme should be conducted very thoroughly to obtain as much information as possible in regard to the training needs of both employees and the organisation.

- Levels two, three and four (i.e. learning, behaviour and results evaluation) of Kirkpatrick's evaluation model should be conducted as a continuum.

- A collaborative approach needs to be followed by the line manager and the trainer when implementing all phases of the TQM training programme.

6.3 PROPOSALS FOR FURTHER RESEARCH

Based on the research findings, the following areas for future research are identified:

- Exploring the recommendations identified above as to their impact on a TQM strategy.

- Identifying and researching other training methodologies, which were not covered here and determining its effectiveness in implementing TQM training programmes.

- Conducting an investigation on organisational variables, other than the training and development approaches followed, to determine the influence thereof on the successful implementation of a TQM training programme.

- The findings obtained in this research survey on the successful implementation of TQM training programmes can be reflected in studies undertaken on other manufacturing sectors of the South African economy.

6.4 CONCLUSION

In summary, this research identified the contribution that different training and development approaches make towards the successful implementation of a TQM strategy to ensure the continuity of a TQM programme. However, the research identified that no single variable, or group of related variables, is responsible for the successful implementation of a TQM programme. Various dependent and independent variables contribute to the efficient and effective implementation of a TQM programme.

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APPENDICES

THE BREAKWATER MONITOR – MARCH 1994 REPORT: TRAINING AND DEVELOPMENT DATA

TOTAL TRAINING INCIDENTS: 369 215

TRAINING INCIDENTS BY RACE:

WHITE	BLACK	COLOUREDS	ASIANS
46,9%	46,5%	4,6%	2%

TOTAL TRAINING EXPENDITURE: R 627 790 189,30

TRAINING EXPENDITURE BY LEVEL (AS A PERCENTAGE OF TOTAL EXPENDITURE):

PATERSON BAND	PERCENTAGE
D-F	16%
C	26%
B	39%
A	18%

TRAINING EXPENDITURE BY TYPE:

TRAINING TYPE:	PERCENTAGE:
Technical / Skills upgrade	39,26%
Management	21%
Operations	4,92%
Literacy	4,14%
Other	30,68%

TRAINING EXPENDITURE BY SOURCE:

INTERNAL = 81,4% **EXTERNAL = 18,6%**

AVERAGE EXPENDITURE PER TRAINING INCIDENT: R 1 943,05

AVERAGE TRAINING EXPENDITURE PER EMPLOYEE: R 1 319,13

Source: A. Bowmaker-Falconer and F. Horwitz, 1994. "Enhancing Competitiveness through Strategic Human Resources". *People Dynamics*, 12(8): 18-19.

BASIC INDICATORS OF VARIOUS COUNTRIES

COUNTRY	POPULATION (MILLIONS) MID-1992	AREA (THOUSANDS SQ KIM)	$ 1992	AVERAGE ANNUAL GROWTH RATE 1980-92
Argentina	33.1	2 767	6 050	-0.9
Australia	17.5	7 713	17 260	1.6
Botswana	1.4	582	2 790	6.1
China	1 162.2	9 561	470	7.6
France	57.4	552	22 260	1.7
Germany	80.6	357	23 030	2.4
India	883.6	3 288	310	3.1
Japan	124.5	378	28 190	3.6
Kenya	25.7	580	310	0.2
Mozambique	16.5	802	60	-3.6
Nigeria	101.9	924	320	-0.4
Poland	38.4	313	1 910	0.1
South Africa	**39.8**	**1 221**	**2 670**	**0.1**
Sweden	8.7	450	27 010	1.5
Tanzania	25.9	945	110	0.0
Thailand	58.0	513	1 840	6.0
United Kingdom	57.8	245	17 790	2.4
United States	255.4	9 373	23 240	1.7
Zimbabwe	10.4	391	570	-0.9

Source: World Development Report, 1994 as depicted in Editors Incorporated Publication, *SA 95/96 South Africa at a glance*, 1996: 119.

THE WORLD COMPETITIVENESS SCOREBOARD FINAL RANKING 1997

POSITION	COUNTRY	POSITION	COUNTRY	POSITION	COUNTRY	POSITION	COUNTRY
1	United States	14	Germany	27	China	40	Mexico
2	Singapore	15	Ireland	28	Argentina	41	India
3	Hong Kong	16	Sweden	29	Thailand	42	Colombia
4	Finland	17	Malaysia	30	South Korea	43	Poland
5	Norway	18	Australia	31	Philippines	**44**	**South Africa**
6	Netherlands	19	France	32	Portugal	45	Venezuela
7	Switzerland	20	Austria	33	Brazil	46	Russia
8	Denmark	21	Iceland	34	Italy		
9	Japan	22	Belgium	35	Czech Republic		
10	Canada	23	Taiwan	36	Hungary		
11	United Kingdom	24	Chile	37	Greece		
12	Luxembourg	25	Spain	38	Turkey		
13	New Zealand	26	Israel	39	Indonesia		

Source: World Competitiveness Report, IMD, Lusanne as depicted in *Productivity SA*, July/August, 1997:4.

WORLD COMPETITIVENESS PROFILE
SOUTH AFRICA
RANKING EVOLUTION

FACTORS OF COMPETITIVENESS

1993	1994	1995	1996	1997
DOMESTIC ECONOMY				
41	42	42	44	42

1993	1994	1995	1996	1997
GOVERNMENT				
43	38	35	37	34

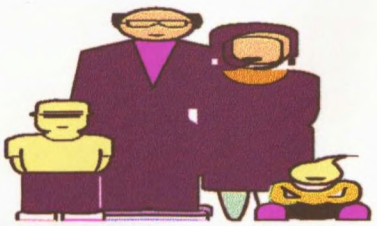
1993	1994	1995	1996	1997
INFRASTRUCTURE				
32	37	30	32	33

1993	1994	1995	1996	1997
SCIENCE & TECHNOLOGY				
29	28	31	34	40

1993	1994	1995	1996	1997
INTERNATIONALISATION				
32	35	38	39	46

1993	1994	1995	1996	1997
FINANCE				
23	26	27	31	36

1993	1994	1995	1996	1997
MANAGEMENT				
32	35	38	40	37



1993	1994	1995	1996	1997
PEOPLE				
46	46	46	46	46

Source: *Productivity SA*, July/August 1997:5.

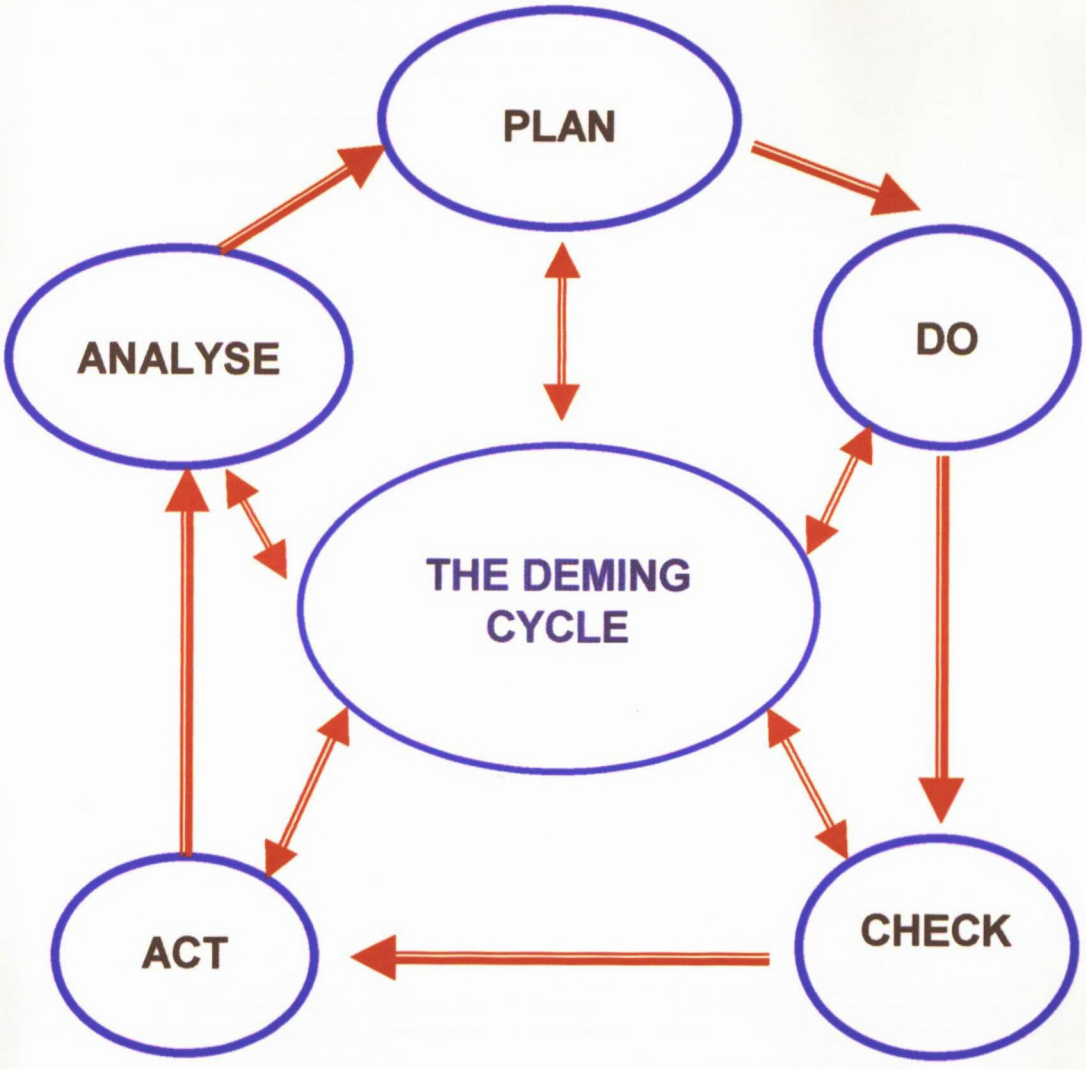
THE SALIENT CHARACTERISTICS OF DEMING'S APPROACH

A. GENERAL	Definition of quality	Customer-led
	Main emphasis	Process
	Dominant factor	Control of variation
	Scope of application	Holistic
	Applicability sector	Manufacturing emphasis
B. EXTERNAL INTERFACE	Customer focus	Surprise, delight customers, anticipate customers' needs
	Market focus	Quality needed to stay in business
	Vendor / buyer relationship	Considered integral: quality requirement of vendors
C. ORGANISATIONAL CONTEXT	Primary change agent	Top management
	Top management role	To promote quality, to work on the system
	Management style	Participative
	Organisational culture	Quality as an organisational culture and the integrated need to break down 'barriers'

APPENDIX E CONTINUES

D. ORGANISATIONAL REQUIREMENTS	Top management commitment	Essential starting point
	Employees involvement and participation	Essential
	Education and training	Essential – a vigorous programme
	Investment in non-human resources	Essential – to reduce costs
E. MEANS/ TECHNIQUES	Costs of quality (appreciated)	Reduce total costs
	Training programmes	Essential – especially training on the job for all to re-skill
	Participation feedback (e.g. communication, quality circles)	Achieve in both positive way (e.g. teamwork) and negative way (e.g. drive out fear or eliminate exhortations)
	Statistical methods	Statistical process control
	Recognition / rewards system	Increased job satisfaction through quality and pride in workmanship – performance appraisals irrelevant
	Inspection procedures	End mass inspection, which accepts errors / defects and obtain statistical evidence of built-in quality
F. CHANGE	Pace of change	Implicitly gradual
	Nature of change	Continuous improvement

Source: A. Ghobadian and S. Speller, 1994. "Gurus of Quality: A Framework for Comparison". *Total Quality Management*, 5(3):69.



Source: D.L. Goetsch and S. Davis, 1994. *Introduction to Total Quality: Quality, Productivity, and Competitiveness*. New York: Macmillan College Publishing Company, p. 21.

DEMING'S FOURTEEN POINTS

1. Create constancy of purpose for improvement of products and services in order to become competitive.	8. Drive out fear so that everyone may work effectively.
2. Adopt the new philosophy.	9. Break down barriers between departments so that people can work as a team.
3. Create dependence on mass inspection to achieve quality.	10. Eliminate slogans, exhortations, and targets for the workforce.
4. Stop awarding contracts on the basis of low bids.	11. Eliminate numerical quotas.
5. Improve continuously and forever the system of production and service, to improve quality and productivity, and thus reduce costs.	12. Remove barriers that rob employees of their pride and workmanship.
6. Institute training on the job.	13. Institute a vigorous programme of retraining, education, and self-improvement.
7. Institute leadership to help people and technology work better.	14. Take action to accomplish the transformation.

Source: D.L. Goetsch and S. Davis, 1994. *Introduction to Total Quality: Quality, Productivity, and Competitiveness*. New York: Macmillian College Publishing Company, p.22.

SALIENT CHARACTERISTICS OF JURAN'S APPROACH

A. GENERAL	Definition of quality	Customer-led
	Main emphasis	People
	Dominant factor	Fitness for purpose
	Scope of application	Comprehensive program for product life span
	Applicability sector	Manufacturing and services
B. EXTERNAL INTERFACE	Customer focus	Integral to quality definition
	Market focus (environment)	Not specific
	Vendor / buyer relationship	Multiple suppliers – not stressed
C. ORGANISATIONAL CONTEXT	Primary change agent	Management
	Top management role	Educative, supportive, avoiding exhortation
	Management style	Participative, enabling
	Organisational culture	Integrated
D. ORGANISATIONAL REQUIREMENTS	Top management commitment	Essential
	Employee involvement and participation	Essential
	Education and training	Essential
	Investment in non-human resources	As part of the improvement programmes

APPENDIX H CONTINUES

E. MEANS/ TECHNIQUES, ETC.	Costs of quality (appreciated	Objective is to obtain optimal quality
	Training programmes	Teamwork approach on breakthrough projects; annual programmes
	Participation feedback (e.g. communication, quality circles)	Emphasis on participation and teamwork
	Statistical methods	Some reference to; not integral to approach
	Recognition / rewards system	Emphasis on recognition
	Inspection procedures	Eliminate inspection departments
F. CHANGE	Pace of change	Gradual
	Nature of change	Step by step, e.g. breakthrough projects

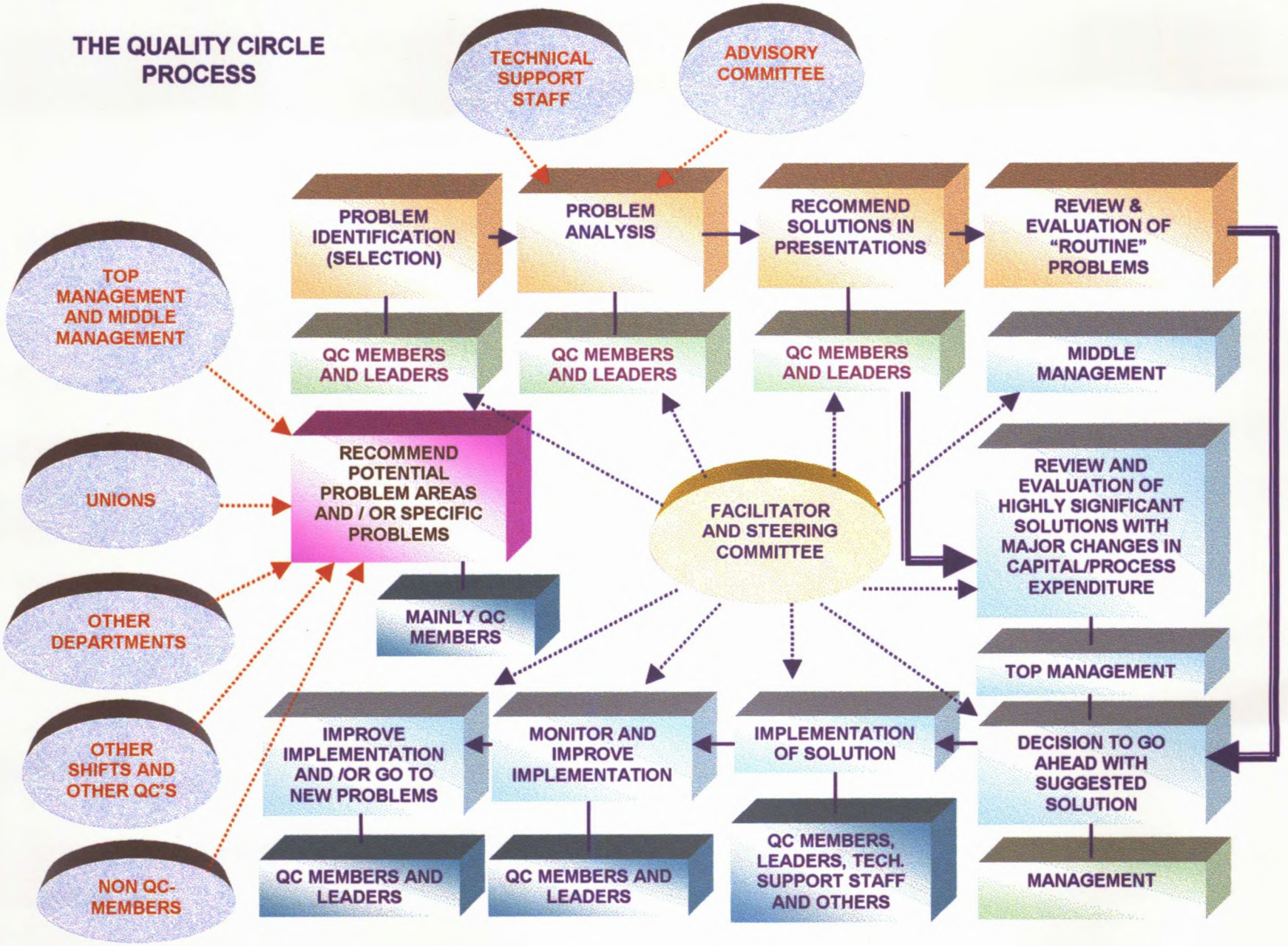
Source: A. Ghobadian and S. Speller, 1994. "Gurus of Quality: A Framework for Comparison". *Total Quality Management*, 5(3):69.

JURAN'S TEN STEPS TO QUALITY IMPROVEMENT

1. Build awareness of both the need for improvement and opportunities for improvement.	6. Report progress.
2. Set goals for improvement.	7. Give recognition.
3. Organise to meet the goals that have been set.	8. Communicate results.
4. Provide training.	9. Keep score.
5. Implement projects aimed at solving problems.	10. Maintain momentum by building improvement into the company's regular systems.

Source: D.L. Goetsch and S. Davis, 1994. *Introduction to Total Quality: Quality Productivity, and Competitiveness*. New York: Macmillan College Publishing Company, p.25.

THE QUALITY CIRCLE PROCESS



Source: D.W.F. Bendix and H.J. Bocker 1981. "Quality Circles as a Managerial Response to the Productivity Crisis." Publication unknown, p.ii.

CATEGORIES IN THE FOOD MANUFACTURING INDUSTRY

1.	ANIMAL SLAUGHTERING AND POULTRY DRESSING
2.	CANNED AND PREPARED MEATS
3.	DAIRY PRODUCTS AND/OR ICE CREAM
4.	CANNED FRUIT AND VEGETABLES
5.	FISH PRODUCTS AND SIMILAR FOODS
6.	VEGETABLE AND ANIMAL OILS AND FATS
7.	GRAIN MILL PRODUCTS
8.	BAKERY PRODUCTS
9.	SUGAR
10.	CHOCOLATES, SUGAR CONFECTIONERY AND COCOA
11.	ROASTED PEANUTS AND OTHER NUTS
12.	COFFEE ROASTING, TEA BLENDING AND PACKING
13.	FOOD PRODUCTS, NOT ELSEWHERE CLASSIFIED

Source: Central Statistical Service, 4 June 1996. *Manufacturing Statistics: Products manufactured: food, beverages and tobacco products – March 1996.* Statistical release P3051.1, p.2.

VALUE OF SALES IN THE TOTAL MANUFACTURING INDICES OF SOUTH AFRICA

MANUFACTURING DIVISIONS	R 1000			
	YEAR 1996	OCT 1997	SEPT 1997	OCT 1996
TOTAL	**331 815 265**	**34 970 762**	**30 575 656**	**32 312 237**
Food and food products	**51 306 023**	**5 190 923**	**4 331 451**	**4 984 964**
Beverages	16 247 507	1 680 244	1 533 658	1 507 213
Textiles	9 064 196	984 213	884 464	869 124
Wearing apparel	7 383 526	965 208	819 782	832 443
Tanning and dressing of leather	1 644 701	183 564	143 741	161 843
Footwear	2 292 311	232 233	220 798	226 992
Wood and products of wood	5 264 529	597 049	550 734	531 084
Paper and paper products	16 179 528	1 608 367	1 573 282	1 540 024
Publishing and printing	9 429 976	993 752	901 875	868 254
Coke and refined petroleum products	18 555 078	1 692 439	1 544 674	1 667 666
Basic chemicals	15 552 192	1 638 647	1 447 113	1 529 827
Other chemical products	19 310 251	2 112 488	1 828 241	1 899 907
Rubber products	3 963 194	385 791	382 100	351 514
Plastic products	8 883 465	941 431	824 547	914 357
Other non-metallic mineral products	8 453 571	866 616	874 616	856 413
Basic iron and steel products	22 279 348	2 224 414	2 020 394	2 020 326
Basic precious and non-ferrous metal products	10 841 732	1 016 409	1 074 517	975 276
Fabricated metal products	19 646 930	2 616 499	1 879 694	1 945 824
General and special purpose machinery and apparatus	18 337 078	2 006 547	1 701 081	1 785 099
Electrical machinery and apparatus	9 600 176	1 022 723	939 342	897 158
Radio, television and communication apparatus	2 902 572	322 998	293 078	264 275
Professional equipment	1 056 380	104 642	95 420	100 047
Motor vehicles, trailers parts and accessories	34 158 403	3 225 789	2 838 882	3 560 208
Other transport equipment	1 842 495	222 228	122 732	209 848
Furniture	4 905 148	641 661	534 335	553 239
Other manufacturing industries	8 805 162	1 056 229	832 963	358 339

Source: Central Statistical Services, 3 November 1995. *Manufacturing Statistics: Indices of the Physical Volume of manufacturing production. Base: 1990 = 100.* Statistical release P3041. Pretoria, p.37.

GROSS OUTPUT FOR THE TOTAL MANUFACTURING INDICES OF SOUTH AFRICA

MANUFACTURING MAJOR GROUPS	R1 000	
	MANUFACTURING CENSUS	
	1987-1990	1991-1995
TOTAL		**194 809 665**
Food	**18 258 452**	**28 288 130**
Beverages	4 879 961	8 607 480
Tobacco Products	730 662	1 065 949
Textiles	5 279 186	7 445 085
Wearing apparel, excluding footwear	3 207 111	5 355 349
Leather and leather products	610 088	898 314
Footwear	1 164 486	1 970 770
Wood and wood and cork products, excluding furniture	2 015 457	3 283 050
Furniture (wood)	1 706 087	2 854 521
Paper and paper products	5 660 942	9 180 849
Printing publishing & allied industries	3 246 761	5 472 040
Industrial chemicals	6 409 926	10 422 294
Other chemical products, excluding products of petroleum and coal	6 461 505	10 254 957
Products of petroleum and coal	6 994 055	11 377 087
Rubber products	1 529 027	2 611 955
Plastic products	2 854 058	4 673 618
Pottery	155 371	236 138
Glass and glass products	1 001 325	1 668 856
Other non-metallic mineral products	3 452 734	5 438 113
Basic iron and steel industries, including steel pipe and tube mills	9 111 522	13 292 767
Basic non-ferrous products	2 876 227	4 588 053
Metal products, excluding machinery	8 121 043	13 930 565
Machinery and equipment	6 751 646	11 719 905
Electrical machinery, apparatus, appliances and supplies	5 928 374	8 992 554
Motor vehicles, parts & accessories	8 771 134	15 896 513
Transport equipment, excluding motor vehicles, parts and accessories	1 304 686	1 898 649
Professional & scientific, measuring & controlling equipment & photographic and optical goods	480 655	672 927
Other manufacturing industries	1 363 392	2 713 180

Source: Central Statistical Services, 3 November 1995. *Manufacturing Statistics: Indices of the Physical Volume of manufacturing production. Base: 1990 = 100.* Statistical release P3041. Pretoria, p.37.

TOTAL QUALITY MANAGEMENT QUESTIONNAIRE

QUESTIONNAIRE NO:.....

INSTRUCTIONS

1. ANSWER THE FOLLOWING QUESTIONS BY "*CIRCLING*" THE APPROPRIATE OPTION.
2. DO NOT USE THE COLUMN "*FOR OFFICE USE*".
3. PLEASE PRINT IN **BOLD** LETTERS.

PLEASE NOTE: YOUR RESPONSE WILL BE KEPT **CONFIDENTIAL**. THE INFORMATION FROM THE QUESTIONNAIRE IS **SOLELY** FOR THE PURPOSES OF MY RESEARCH, THEREFORE FEEL FREE TO BE HONEST.

SECTION ONE: BIOGRAPHICAL INFORMATION

1.1 Please complete the following biographical information:

1. COMPANY NAME: .....

2. DEPARTMENT: .....

*1.2 Indicate which of the following **BEST** describes the division of the food industry in which the organisation operates:*

FOR OFFICE USE 01

1.	Dairy products and / or Ice cream	2.	Animal slaughtering and paultry dressing
3.	Butter and Cream	4.	Sugar
5.	Coffee roasting, tea blending and packaging	6.	Bakery products
7.	Flour and other grain mill products	8.	Canned and preserved fruit and vegetables
9.	Canned and prepared meats	10.	Canned and preserved fish and fish products
11.	Chocolates, sugar confectionery and cocoa	12.	Cooking oils, edible oils and margarine
13.	Roasted peanuts and other nuts	14.	Other

PTO/p2

*1.3 Which one of the following **BEST** describes the operational level of the organisation?*

FOR OFFICE USE

1. Regional	2. National	3. International	02

1.4 Please indicate the total number of employees in your organisation:

1. Under 1000	2. 1000 - 4999	3. 5000 or more	03

1.5 The company sells:

1. Directly to the public	2. Through retailers / wholesalers	3. Both	04

SECTION TWO: QUALITY

*2.1 Which **ONE** of the following definitions **BEST** describes your organisations emphasis on quality:*

05

1. Process quality: focusing on production
2. Product quality: focusing on technical specifications
3. Benefit quality: focusing on meeting customers' expectations

2.2 In your organisation quality circles:

06

1. Are presently implemented
2. Have never been implemented
3. Are not implemented any longer

PTO/p3

SECTION THREE: TOTAL QUALITY MANAGEMENT

FOR OFFICE USE

3.1 *How long has TQM been implemented in your organisation?*

1. Less than six months	07
2. More than six months, but less than a year	
3. More than a year, but less than three years	
4. More than three years, but less than five years	
5. More than five years	

3.2 *The TQM strategy was drawn up by:*

1. Consultants	2. Management	3. Both	08

3.3 *Which **ONE** of the following do you consider as being the most significant communicator for TQM changes in your organisation?*

1. Line managers	2. Consultants	3. Training department	09

3.4 *In your opinion, does TQM training lack credibility in your organisation?*

1. Yes	2. No	10

*If answered **YES**, please indicate with whom of the following does TQM training lack credibility in your organisation:*

1. Employees	2. Line management	3. Both	11

SECTION FOUR: TRAINING AND DEVELOPMENT

4.1 *Who is responsible for training staff on TQM aspects in your organisation?*

1. Training officer	2. Line manager	3. Both	12

PTO/p4

4.2 *The following questions pertains to the TQM training programme in your organisation. Indicate your choice for each question by circling **ONE** of the following options listed below:*

FOR OFFICE USE

1 = TRAINER / TRAINING AND DEVELOPMENT SECTION
2 = LINE MANAGER
3 = BOTH / IN JOINT COLLABORATION

A.	TQM training needs are diagnosed by:	1	2	3	13
B.	The TQM training objectives are concluded by:	1	2	3	14
C.	The basic TQM programme design is decided upon by:	1	2	3	15
D.	The contents of the TQM training programme is determined by:	1	2	3	16
E.	Programme implementation decisions are taken by:	1	2	3	17
F.	The form of evaluation is chosen by:	1	2	3	18
G.	When TQM skills transfer appears not to be occuring, who identifies these problems?	1	2	3	19
H.	Who takes action to resolve these skills transfer problems?	1	2	3	20

4.3 *Please read each statement carefully and indicate to what extent you **agree or disagree** by choosing **ONE** of the following:*

1 = STRONGLY AGREE
2 = AGREE
3 = UNSURE
4 = DISAGREE
5 = STRONGLY DISAGREE

A.	The trainer conducts a needs analysis before implementing a TQM programme.	1	2	3	4	5	21
B.	Managers are insensitive to TQM performance problems in their sections/departments.	1	2	3	4	5	22
C.	The trainer evaluates whether the trainees are applying on the job the TQM skills learned.	1	2	3	4	5	23
D.	The trainees have no immediate application for the TQM skills learned.	1	2	3	4	5	24

PTO/p5

1 = STRONGLY AGREE
2 = AGREE
3 = UNSURE
4 = DISAGREE
5 = STRONGLY DISAGREE

FOR OFFICE USE

E.	The trainer provides regular reports on the TQM training project to line management.	1	2	3	4	5	25
F.	Trainees perceive TQM training as being irrelevant to their job functions.	1	2	3	4	5	26
G.	The physical work environment supports the trainees' skills acquired.	1	2	3	4	5	27
H.	The trainees do not see the payoff for using the TQM skills learned.	1	2	3	4	5	28
I.	The benefits of TQM training are assessed in the light of its overall contribution to the organisation.	1	2	3	4	5	29
J.	The result of TQM training is measured.	1	2	3	4	5	30
K.	Trainees experience a lack of authority to use their skills.	1	2	3	4	5	31
L.	Trainees receive little feedback about the use of their skills.	1	2	3	4	5	32
M.	The line manager assists the trainer in preparing the work environment to support TQM training.	1	2	3	4	5	33
N.	TQM training is perceived by the trainees to be impractical.	1	2	3	4	5	34
O.	The trainer determines whether the trainees have learned the objectives of the TQM training programme.	1	2	3	4	5	35
P.	The return on TQM training investments does not justify its expenditure.	1	2	3	4	5	36
Q.	The training department has established a partnership with line management.	1	2	3	4	5	37
R.	Managers do not reinforce the trainees' use of TQM skills.	1	2	3	4	5	38
S.	The line manager and the trainer form a joint collaboration in conducting the TQM programme.	1	2	3	4	5	39
T.	Managers do not coach trainees in the use of the TQM skills on-the-job.	1	2	3	4	5	40

THE END

THANK YOU FOR YOUR KIND CO-OPORATION.

TABLE OF RANDOM NUMBERS

75421	11182	31304	08036	86922	77941	88944	30226	60766	90951
06692	19591	14171	04356	06744	46546	99184	97684	43285	96345
66065	12379	70386	09035	90126	74677	39885	84335	09442	21772
01098	06343	08873	94702	07203	60936	54445	12423	64560	99694
93526	56837	42025	45578	95193	97695	53146	51370	79913	83145
85129	31088	36253	40011	62078	72245	58783	47555	55681	45450
74312	81501	94303	30800	60660	69979	57625	00050	69795	15120
67348	11345	13361	40573	75687	78415	42407	97830	98069	98605
29241	77892	67728	60876	53046	75840	18933	18108	73509	76958
04366	94984	95131	22993	17240	63185	54786	31607	50705	61581
54205	61584	99698	74013	88263	96563	18003	77390	05762	40975
52801	44366	19745	74219	20982	91400	50685	56541	68392	96624
02573	59494	26362	40769	39340	19677	16923	04761	65952	03630
15896	32426	64984	99029	58073	28814	44849	39871	00825	29966
26032	33340	54573	55786	75383	14546	37499	43894	86358	19706
41349	18921	50835	65861	79521	38319	33999	74851	97319	17221
31246	35797	89051	36319	38137	11101	02808	36771	63163	00816
55704	87671	81967	18984	94617	89097	91625	49172	07106	06218
09107	53117	75664	25300	98186	29702	73632	77044	08238	08097
53779	05917	99367	58743	63981	66547	45685	11168	81086	29458
05252	99475	70537	29636	46984	49231	73571	64092	26162	26361
92966	81458	79792	39399	39278	20247	45367	76937	64563	73930
68109	88529	70116	11782	24198	68334	83184	26202	49315	38471
53118	70359	68973	95173	29213	29969	00445	24846	50957	80443
60924	44136	71034	80642	62977	93957	21006	66422	96753	69814
11151	59784	77446	64703	22038	40357	57749	62349	88018	20160
32731	14203	36222	13436	16935	26412	09879	27931	54679	35275
04037	48341	95595	26036	57521	16245	71204	44232	09527	49083
75807	89169	30622	23911	73689	50718	33796	30145	97763	75437
93509	65893	82351	54938	26829	04823	71697	46159	43465	99159
93528	38008	53069	29029	36617	09019	95758	52955	75018	83253
10603	93078	11673	36373	71957	89710	15378	52022	57934	86236
99155	30214	58351	16606	08569	19665	22531	58753	22759	90501
97268	87653	40124	51615	27365	26827	70255	23368	78952	05515
93564	66965	91850	25093	53517	39997	17521	57074	75743	11610
06959	27612	66188	19351	17367	84340	00247	49881	01997	33756
13172	61241	53558	59919	15082	75692	43138	22677	55844	70034
03690	57173	38889	03032	69496	42566	23096	43416	78732	12420
38005	70085	74744	32644	88440	12489	39538	64712	92792	51310
28758	45596	59049	79799	68763	49827	57854	76334	99237	11388
84260	58136	31250	88953	04929	06903	21175	42463	15227	15205
77800	77252	68397	37935	53941	59771	92875	37004	57044	18210
99505	24764	22807	54083	90303	54462	71223	96233	88058	03268
53803	68932	38510	87838	68543	73671	57403	50077	63351	55781
68379	47885	33501	10666	84222	81999	16699	51745	84672	11640
30033	45809	69655	31679	56931	40579	53867	22586	00794	67305
73888	69685	91050	60898	06171	01165	04192	03700	27979	76516
50935	51867	76172	52543	38383	43396	67725	68868	15571	78654

Source: R.D. Mason and D.A. Lind 1990. Statistical Techniques in Business and Economics. 7th edition. Homewood, Illinois: Richard D. Irwin, p. 855.

THE SAMPLE OF ORGANISATIONS SELECTED PER DIVISION IN THE SOUTH AFRICAN FOOD MANUFACTURING INDUSTRY

CATEGORIES OF THE FOOD MANUFACTURING INDUSTRY	NUMBER OF COMPANIES SELECTED IN THE TOTAL POPULATION	TOTAL NUMBER OF COMPANIES LISTED IN THE COMMERCIAL DIRECTORY OF SOUTHERN AFRICA
Animal slaughtering and poultry dressing	60	140
Canned and prepared meats	60	145
Dairy products and/or ice cream	60	295
Canned fruit and vegetables	60	166
Fish products and similar foods	60	185
Vegetable and animal oils and fats	60	85
Grain mill products	60	196
Bakery products	60	155
Sugar	60	194
Chocolates, sugar confectionery and cocoa	60	258
Roasted peanuts and other nuts	28*	28
Coffee roasting, tea blending and packing	44*	44
Butter and cream	60	151
Other	60	325
TOTAL NUMBER OF COMPANIES	**792**	**2367**

* In these categories the number of companies selected, are the total numbers listed.

CHITEST STATISTIC CALCULATIONS FOR STATEMENTS 7 AND 10

OBSERVED FREQUENCY TABLE:

THE CREDIBILITY OF TQM TRAINING PROGRAMMES (STATEMENT 10)	THE PERIOD THAT TQM HAS BEEN IMPLEMENTED AT THE ORGANISATION (STATEMENT 7)					ROW TOTAL
	OPTION 1:	OPTION 2:	OPTION 3:	OPTION 4:	OPTION 5:	
	1.00	2.00	3.00	4.00	5.00	
OPTION 1: TQM TRAINING LACKS CREDIBILITY	4	6	21	37	22	90
OPTION 2: TQM TRAINING IS CREDIBLE	1	7	39	19	15	81
COLUMN TOTAL	5	13	60	56	37	171

EXPECTED FREQUENCY TABLE:

FORMULA: $\frac{\text{(row total x column total)}}{\text{grand total}}$

THE CREDIBILITY OF TQM TRAINING PROGRAMMES (STATEMENT 10)	THE PERIOD THAT TQM HAS BEEN IMPLEMENTED AT THE ORGANISATION (STATEMENT 7)					ROW TOTAL
	OPTION 1:	OPTION 2:	OPTION 3:	OPTION 4:	OPTION 5:	
	1.00	2.00	3.00	4.00	5.00	
OPTION 1: TQM TRAINING LACKS CREDIBILITY	2.631579	6.842105	31.57895	29.47368	19.47368	90
OPTION 2: TQM TRAINING IS CREDIBLE	2.368421	6.157895	28.42105	26.52632	17.52632	81
COLUMN TOTAL	5	13	60	56	37	171

To derive the Chi-square sample statistic, the following chi-square formula is used:

$$\chi^2_{calc} = \sum \frac{(f_o - f_e)^2}{f_e}$$

Where f_o = observed frequency per cell

f_e = expected frequency per cell

APPENDIX Q CONTINUES

Computationally the chi-square statistics χ^2_{calc} is found as follows:

	CELL	*fo*	*fe*	$(fo-fe)^2$	$\frac{(fo-fe)^2}{fe}$
STATEMENT 10	OPTION 1	4	2.631579	1.872576	0.711579
		1	2.368421	1.872576	0.790643
	OPTION 2	6	6.842105	0.709141	0.103644
		7	6.157895	0.709141	0.11516
	OPTION 3	21	31.57895	111.9141	3.543947
		39	28.42105	111.9141	3.937719
	OPTION 4	37	29.47368	56.64543	1.921898
		19	26.52632	56.64543	2.135443
	OPTION 5	22	19.47368	6.382271	0.327738
		15	17.52632	6.382271	0.364154
				χ^2calc =	13.95193

Value of the chi-square sample statistic is 13.95193.

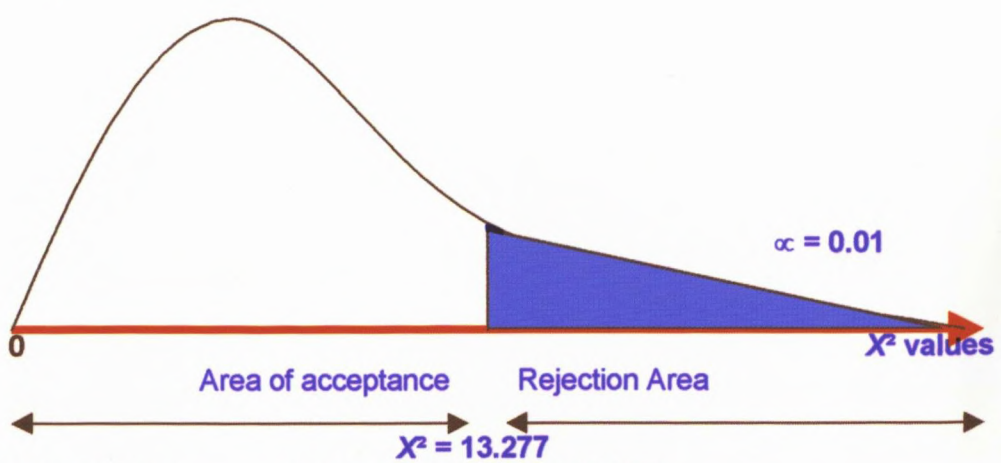
Degrees of freedom (DF): (r-1)(c-1) = (2-1)(5-1) = 4

$\propto = 0.01$

RESULTS OF THE CHI-SQUARE STATISTIC FOR STATEMENT 7 AND 10

CHI-SQUARE	VALUE	DF	SIGNIFICANCE
Pearson	13.95193	4	0.00745
Likelihood Ratio	14.23665	4	0.00658
Mantel-Haenszel test for linear association	2.67691	1	0.10181

Graphically:



The decision rule is: Accept Ho if $X^2 \leq 13.277$

Reject Ho if $X^2 > 13.277$

Therefore: Reject Ho at the one percent level of significance.

CHITEST STATISTIC CALCULATIONS FOR STATEMENT 8 AND 10

OBSERVED FREQUENCY TABLE:

THE CREDIBILITY OF A TQM TRAINING PROGRAMME (STATEMENT 10)	WHO HAD DESIGNED THE TQM STRATEGY FOR THE ORGANISATION (STATEMENT 8)			ROW TOTAL
	OPTION 1: CONSULTANTS	OPTION 2: MANAGEMENT	OPTION 3: BOTH	
	1.00	2.00	3.00	
OPTION 1: TQM TRAINING LACKS CREDIBILITY	23	51	16	90
OPTION 2: TQM TRAINING IS CREDIBLE	12	53	16	81
COLUMN TOTAL	35	104	32	171

EXPECTED FREQUENCY TABLE:

FORMULA: $\dfrac{\text{(row total x column total)}}{\text{grand total}}$

THE CREDIBILITY OF A TQM TRAINING PROGRAMME (STATEMENT 10)	WHO HAD DESIGNED THE TQM STRATEGY FOR THE ORGANISATION (STATEMENT 8)			ROW TOTAL
	OPTION 1: CONSULTANTS	OPTION 2: MANAGEMENT	OPTION 3: BOTH	
	1.00	2.00	3.00	
OPTION 1: TQM TRAINING LACKS CREDIBILITY	18.42105	54.73684	16.84211	90
OPTION 2: TQM TRAINING IS CREDIBLE	16.57895	49.26316	15.15789	81
COLUMN TOTAL	35	104	32	171

To derive the Chi-square sample statistic, the following chi-square formula is used:

$$\chi^2_{calc} = \sum \frac{(f_o - f_e)^2}{f_e}$$

Where f_o = observed frequency per cell

f_e = expected frequency per cell

APPENDIX R CONTINUES

Computationally the chi-square statistics χ^2_{calc} is found as follows:

	CELL	fo	fe	$(fo-fe)^2$	$\frac{(fo-fe)^2}{fe}$
STATEMENT 10	OPTION 1	23	18.42105	20.96676	1.138195
		12	16.57895	20.96676	1.264662
	OPTION 2	51	54.73684	13.96399	0.255111
		53	49.26316	13.96399	0.283457
	OPTION 3	16	16.84211	0.709141	0.042105
		16	15.15789	0.709141	0.046784
				χ^2calc =	3.030314

Value of the chi-square sample statistic is 3.030314.

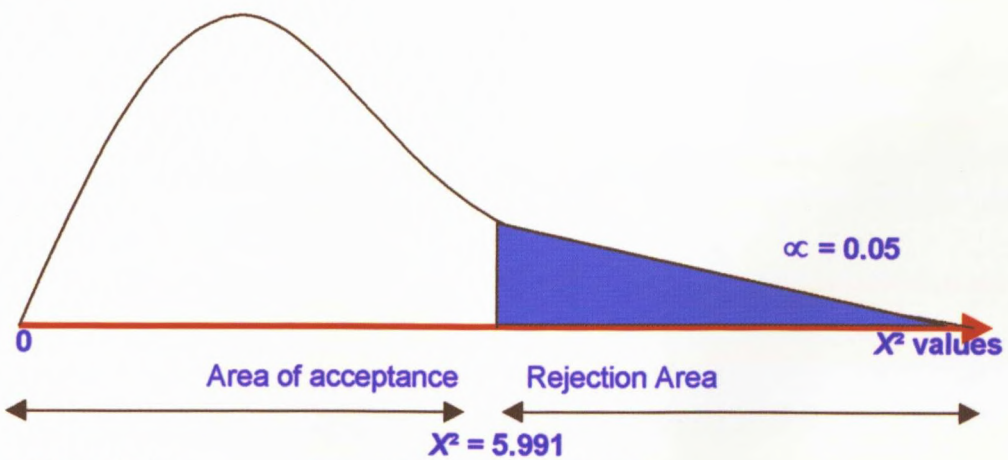
Degrees of freedom (DF): $(r-1)(c-1) = (2-1)(3-1) = 2$

$\propto = 0.05$

RESULTS OF THE CHI-SQUARE STATISTIC FOR STATEMENT 8 AND 10

CHI-SQUARE	VALUE	DF	SIGNIFICANCE
Pearson	3.03031	2	0.21977
Likelihood Ratio	3.08100	2	0.21427
Mantel-Haenszel test for linear association	1.75046	1	0.18582

Graphically:



The decision rule is: Accept Ho if $X^2 \leq 5.991$

Reject Ho if $X^2 > 5.991$

Therefore: Accept Ho at the five percent level of significance.

CHITEST STATISTIC CALCULATIONS FOR STATEMENT 9 AND 10

OBSERVED FREQUENCY TABLE:

THE CREDIBILITY OF A TQM TRAINING PROGRAMME (STATEMENT 10)	THE MOST SIGNIFICANT COMMUNICATOR FOR TQM CHANGES IN THE ORGANISATION (STATEMENT 9)			ROW TOTAL
	OPTION 1: LINE MANAGERS	OPTION 2: CONSULTANTS	OPTION 3: TRAINING DEPARTMENT	
	1.00	2.00	3.00	
OPTION 1: TQM TRAINING LACKS CREDIBILITY	85	4	1	90
OPTION 2: TQM TRAINING IS CREDIBLE	70	2	9	81
COLUMN TOTAL	155	6	10	171

EXPECTED FREQUENCY TABLE:

FORMULA: $\dfrac{\text{(row total x column total)}}{\text{grand total}}$

THE CREDIBILITY OF A TQM TRAINING PROGRAMME (STATEMENT 10)	THE MOST SIGNIFICANT COMMUNICATOR FOR TQM CHANGES IN THE ORGANISATION (STATEMENT 9)			ROW TOTAL
	OPTION 1: LINE MANAGERS	OPTION 2: CONSULTANTS	OPTION 3: TRAINING DEPARTMENT	
	1.00	2.00	3.00	
OPTION 1: TQM TRAINING LACKS CREDIBILITY	81.57895	3.157895	5.263158	90
OPTION 2: TQM TRAINING IS CREDIBLE	73.42105	2.842105	4.736842	81
COLUMN TOTAL	155	6	10	171

To derive the Chi-square sample statistic, the following chi-square formula is used:

$$\chi^2_{calc} = \sum \frac{(f_o - f_e)^2}{f_e}$$

Where f_o = observed frequency per cell

f_e = expected frequency per cell

APPENDIX S CONTINUES

Computationally the chi-square statistics χ^2_{calc} is found as follows:

	CELL	fo	fe	$(fo-fe)^2$	$\frac{(fo-fe)^2}{fe}$
STATEMENT 10	OPTION 1	85	81.57895	11.7036	0.143463
		70	73.42105	11.7036	0.159404
	OPTION 2	4	3.157895	0.709141	0.224561
		2	2.842105	0.709141	0.249513
	OPTION 3	1	5.263158	10.17452	3.453158
		9	4.736842	18.17452	3.3836842
				χ^2calc =	8.066941

Value of the chi-square sample statistic is 8.066941.

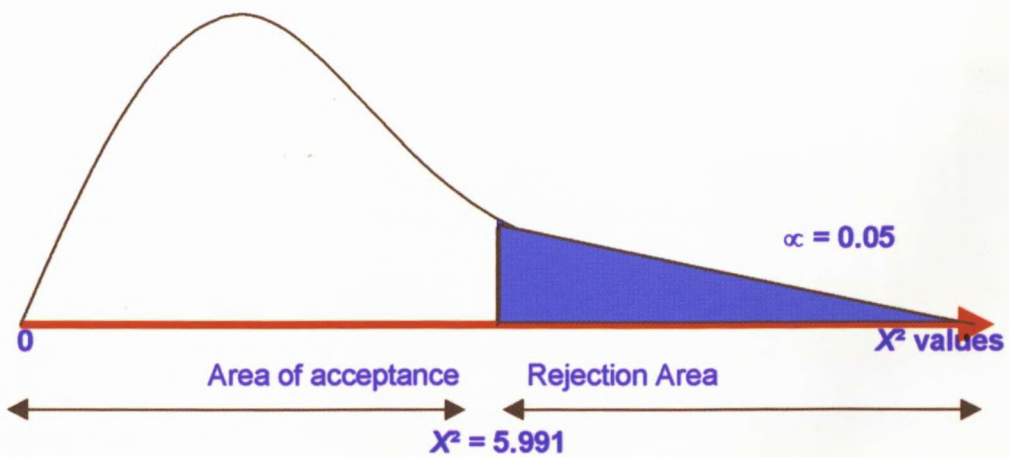
Degrees of freedom (DF): $(r-1)(c-1) = (2-1)(3-1) = 2$

$\alpha = 0.05$

RESULTS OF THE CHI-SQUARE STATISTIC FOR STATEMENT 9 AND 10

CHI-SQUARE	VALUE	DF	SIGNIFICANCE
Pearson	8.06694	2	0.01771
Likelihood Ratio	9.02086	2	0.01099
Mantel-Haenszel test for linear association	5.59994	1	0.01796

Graphically:



The decision rule is: Accept Ho if $X^2 \leq 5.991$

Reject Ho if $X^2 > 5.991$

Therefore: Reject Ho at the five percent level of significance.

PERCENTAGE RESPONSE FOR STATEMENTS 21 TO 40 AS TO WHETHER TQM TRAINING PROGRAMMES LACK CREDIBILITY

CREDIBILITY	STATE-MENT	SUB-TOTALS:	PERCENTAGE RESPONSE					
			OPTION 1: STRONGLY AGREE	OPTION 2: AGREE	OPTION 3: UNSURE	OPTION 4: DISAGREE	OPTION 5: STRONGLY DISAGREE	TOTAL
STATEMENT 10 (OPTION 1) TQM TRAINING PROGRAM-MES LACK CREDIBILITY	21		13.33%	25.55%	2.22%	42.22%	16.66%	
		SUB-TOTALS:	38.88%		2.22%	59.33%		100.00%
	22		7.77%	43.33%	13.33%	25.55%	10.00%	
		SUB-TOTALS:	51.11%		13.33%	35.55%		100.00%
	23		2.19%	28.88%	8.88%	51.11%	8.88%	
		SUB-TOTALS:	31.08%		8.88%	59.99%		100.00%
	24		2.22%	24.44%	17.77%	33.33%	22.22%	
		SUB-TOTALS:	26.66%		17.77%	55.55%		100.00%
	25		4.44%	26.66%	5.55%	44.44%	18.88%	
		SUB-TOTALS:	31.11%		5.55%	63.33%		100.00%
	26		10.00%	43.33%	13.33%	30.00%	3.33%	
		SUB-TOTALS:	53.33%		13.33%	33.33%		100.00%
	27		4.44%	38.88%	16.66%	32.22%	7.77%	
		SUB-TOTALS:	43.33%		16.66%	39.99%		100.00%
	28		5.55%	42.22%	15.55%	33.33%	3.33%	
		SUB-TOTALS:	47.77%		15.55%	36.66%		100.00%
	29		10.00%	30.00%	15.55%	36.6666%	7.7777%	
		SUB-TOTALS:	40.00%		15.55%	44.4443%		100.00%
	30		4.44%	36.66%	7.77%	35.55%	15.55%	
		SUB-TOTALS:	41.11%		7.77%	51.11%		100.00%
	31		6.66%	35.55%	17.77%	32.22%	7.77%	
		SUB-TOTALS:	42.22%		17.77%	39.99%		100.00%
	32		7.77%	42.22%	14.44%	30.00%	5.55%	
		SUB-TOTALS:	49.99%		14.44%	35.55%		100.00%
	33		6.66%	26.66%	16.66%	43.33%	6.66%	
		SUB-TOTALS:	33.33%		16.66%	49.99%		100.00%
	34		8.88%	28.88%	21.11%	23.33%	7.77%	
		SUB-TOTALS:	37.77%		21.11%	41.11%		100.00%

APPENDIX T CONTINUES

PERCENTAGE RESPONSE FOR STATEMENTS 21 TO 40 WHETHER TQM TRAINING PROGRAMMES LACK CREDIBILITY (CONTINUE)

CREDIBILITY	STATE-MENT	SUB-TOTALS:	PERCENTAGE RESPONSE					
			OPTION 1: STRONGLY AGREE	OPTION 2: AGREE	OPTION 3: UNSURE	OPTION 4: DISAGREE	OPTION 5: STRONGLY DISAGREE	TOTAL
STATEMENT 10 (OPTION 1) TQM TRAINING PROGRAM-MES LACK CREDIBILITY	35		3.33%	31.11%	12.22%	40.00%	13.33%	
		SUB-TOTALS:	34.44%		12.22%	53.33%		100.00%
	36		11.11%	30.00%	11.11%	30.00%	17.77%	
		SUB-TOTALS:	41.11%		11.11%	47.77%		100.00%
	37		4.44%	33.33%	15.55%	37.77%	8.88%	
		SUB-TOTALS:	37.77%		15.55%	46.66%		100.00%
	38		7.77%	37.77%	13.33%	33.33%	7.77%	
		SUB-TOTALS:	45.55%		13.33%	41.11%		100.00%
	39		5.55%	35.55%	10.00%	35.55%	13.33%	
		SUB-TOTALS:	41.11%		10.00%	48.88%		100.00%
	40		8.88%	27.77%	13.33%	34.44%	15.55%	
		SUB-TOTALS:	36.66%		13.33%	49.99%		100.00%

PERCENTAGE RESPONSE FOR STATEMENTS 21 TO 40 WHETHER TQM TRAINING PROGRAMMES ARE CREDIBLE

CREDIBILITY	STATE-MENT	SUB-TOTALS:	PERCENTAGE RESPONSE					
			OPTION 1: STRONGLY AGREE	OPTION 2: AGREE	OPTION 3: UNSURE	OPTION 4: DISAGREE	OPTION 5: STRONGLY DISAGREE	TOTAL
STATEMENT 10 (OPTION 2) TQM TRAINING PROGRAM-MES ARE CREDIBLE	21		13.58%	55.55%	3.70%	23.45%	3.70%	
		SUB-TOTALS:	69.13%		3.70%	27.16%		100.00%
	22		3.70%	30.86%	6.17%	48.14%	11.11%	
		SUB-TOTALS:	34.56%		6.17%	59.2592%		100.00%
	23		7.40%	55.55%	9.87%	24.69%	2.46%	
		SUB-TOTALS:	62.96%		9.87%	27.16%		100.00%
	24		2.46%	12.34%	8.64%	49.38%	27.16%	
		SUB-TOTALS:	14.81%		8.64%	76.54%		100.00%
	25		3.70%	49.38%	12.34%	24.69%	9.87%	
		SUB-TOTALS:	53.08%		12.34%	34.56%		100.00%
	26		2.46%	28.39%	7.40%	46.91%	14.81%	
		SUB-TOTALS:	30.84%		7.40%	61.72%		100.00%
	27		18.51%	54.32%	6.17%	18.51%	2.46%	
		SUB-TOTALS:	72.83%		6.17%	20.98%		100.00%
	28		4.93%	27.16%	17.28%	38.27%	12.34%	
		SUB-TOTALS:	32.09%		17.23%	50.61%		100.00%
	29		17.28%	62.96%	3.70%	11.11%	4.93%	
		SUB-TOTALS:	80.24%		3.70%	16.04%		100.00%
	30		9.87%	46.91%	16.04%	22.22%	4.93%	
		SUB-TOTALS:	56.79%		16.04%	27.16%		100.00%
	31		2.46%	35.80%	23.45%	33.33%	4.93%	
		SUB-TOTALS:	38.27%		23.45%	38.27%		100.00%
	32		3.70%	37.03%	8.64%	44.44%	6.17%	
		SUB-TOTALS:	40.74%		8.64%	50.61%		100.00%
	33		12.34%	53.08%	6.17%	24.69%	3.70%	
		SUB-TOTALS:	65.54%		6.17%	28.39%		100.00%
	34		3.70%	24.69%	17.28%	43.20%	11.11%	
		SUB-TOTALS:	28.39%		17.28%	54.32%		100.00%

APPENDIX U CONTINUES

PERCENTAGE RESPONSE FOR STATEMENT 21 TO 40 WHETHER TQM TRAINING PROGRAMMES ARE CREDIBLE (CONTINUE)

CREDIBILITY	STATE-MENT	SUB-TOTALS:	PERCENTAGE RESPONSE					
			OPTION 1: STRONGLY AGREE	OPTION 2: AGREE	OPTION 3: UNSURE	OPTION 4: DISAGREE	OPTION 5: STRONGLY DISAGREE	TOTAL
STATEMENT 10 (OPTION 2) TQM TRAINING PROGRAM-MES ARE CREDIBLE	35		6.17%	51.85%	14.81%	22.22%	4.93%	
		SUB-TOTALS:	58.02%		14.81%	27.16%		100.00%
	36		4.93%	16.04%	7.40%	49.38%	22.22%	
		SUB-TOTALS:	20.98%		7.40%	71.60%		100.00%
	37		11.11%	61.72%	7.40%	18.51%	1.23%	
		SUB-TOTALS:	72.83%		7.40%	19.75%		100.00%
	38		2.46%	14.81%	13.58%	60.49%	8.64%	
		SUB-TOTALS:	17.28%		13.58%	69.13%		100.00%
	39		12.34%	54.32%	17.28%	46.9135%	1.23%	
		SUB-TOTALS:	66.66%		17.28%	48.14%		100.00%
	40		3.70%	19.75%	6.17%	46.91%	23.45%	
		SUB-TOTALS:	23.45%		6.17%	70.37%		100.00%

PERCENTAGE RESPONSE FOR STATEMENTS 21 TO 40

	PERCENTAGE RESPONSE					
STATEMENT	STRONGLY AGREE	AGREE	UNSURE	DISAGREE	STRONGLY DISAGREE	TOTAL
21	13.45%	39.77%	2.92%	33.33%	10.53%	100.00%
22	5.85%	37.43%	9.94%	36.25%	10.53%	100.00%
23	4.68%	41.52%	9.36%	38.59%	5.85%	100.00%
24	2.34%	18.71%	13.45%	40.94%	24.58%	100.00%
25	4.09%	37.43%	8.77%	35.09%	14.62%	100.00%
26	6.43%	36.26%	10.53%	38.01%	8.77%	100.00%
27	11.11%	46.20%	11.70%	25.73%	5.26%	100.00%
28	5.26%	35.10%	16.37%	35.67%	7.60%	100.00%
29	13.46%	45.61%	9.94%	24.56%	6.43%	100.00%
30	7.02%	41.52%	11.69%	29.24%	10.53%	100.00%
31	4.68%	35.67%	20.47%	32.75%	6.43%	100.00%
32	5.85%	39.77%	11.69%	36.84%	5.85%	100.00%
33	9.36%	39.18%	11.69%	34.51%	5.26%	100.00%
34	6.43%	26.90%	19.30%	38.01%	9.36%	100.00%
35	4.68%	40.94%	13.46%	31.56%	9.36%	100.00%
36	8.19%	23.69%	9.36%	39.18%	19.88%	100.00%
37	7.60%	46.78%	11.70%	28.66%	5.26%	100.00%
38	5.26%	26.90%	13.46%	46.20%	8.18%	100.00%
39	8.77%	44.45%	13.45%	25.73%	7.60%	100.00%
40	6.43%	23.98%	9.94%	40.35%	19.30%	100.00%

CHITEST STATISTIC CALCULATIONS FOR STATEMENTS 21 AND 23

OBSERVED FREQUENCY TABLE:

THE TRAINER CONDUCTS A NEEDS ANALYSIS BEFORE IMPLEMENTING A TQM TRAINING PROGRAMME (STATEMENT 21)	THE TRAINER EVALUATES WHETHER THE TRAINEES ARE APPLYING ON THE JOB THE TQM SKILLS LEARNED (STATEMENT 23)					ROW TOTAL
	OPTION 1: STRONGLY AGREE	OPTION 2: AGREE	OPTION 3: UNSURE	OPTION 4: DISAGREE	OPTION 5: STRONGLY DISAGREE	
	1.00	2.00	3.00	4.00	5.00	
OPTION 1: STRONGLY AGREE	5	11	2	4	1	23
OPTION 2: AGREE	3	38	10	17	0	68
OPTION 3: UNSURE	0	2	0	3	0	5
OPTION 4: DISAGREE	0	17	4	33	3	57
OPTION 5: STRONGLY DISAGREE	0	3	0	9	6	18
COLUMN TOTAL	8	71	16	66	10	171

EXPECTED FREQUENCY TABLE: **FORMULA:** $\frac{\text{(row total x column total)}}{\text{grand total}}$

THE TRAINER CONDUCTS A NEEDS ANALYSIS BEFORE IMPLEMENTING A TQM TRAINING PROGRAMME (STATEMENT 21)	THE TRAINER EVALUATES WHETHER THE TRAINEES ARE APPLYING ON THE JOB THE TQM SKILLS LEARNED (STATEMENT 23)					ROW TOTAL
	OPTION 1: STRONGLY AGREE	OPTION 2: AGREE	OPTION 3: UNSURE	OPTION 4: DISAGREE	OPTION 5: STRONGLY DISAGREE	
	1.00	2.00	3.00	4.00	5.00	
OPTION 1: STRONGLY AGREE	1.7076023	9.549707	2.152046	8.877192	1.345029	23
OPTION 2: AGREE	3.181286	28.233918	6.362573	26.24561	3.976608	68
OPTION 3: UNSURE	0.233918	2.076023	0.467836	1.929824	0.292397	5
OPTION 4: DISAGREE	2.666666	23.66666	5.333333	22.00000	3.333333	57
OPTION 5: STRONGLY DISAGREE	0.842105	7.473684	1.684210	6.947368	1.052631	18
COLUMN TOTAL	8	71	16	66	10	171

APPENDIX W CONTINUES

To derive the Chi-square sample statistic, the following chi-square formula is used:

$$\chi^2_{calc} = \sum \frac{(fo-fe)^2}{fe}$$

Where fo = observed frequency per cell

fe = expected frequency per cell

Computationally the chi-square statistics χ^2_{calc} is found as follows:

	CELL	fo	fe	(fo-fe)²	(fo-fe)²/fe
	OPTION 1	5	1.076023	15.39759	14.30971
		11	9.549707	2.103348	0.220252
		2	2.152046	0.023118	0.010742
		4	8.877192	23.78701	2.679564
		1	1.345029	0.119045	0.088507
	OPTION 2	3	3.181286	0.032864	0.010330
		38	28.23391	95.37633	3.378076
		10	6.362573	13.23087	2.079484
		17	26.24561	85.48137	3.256977
		0	3.976608	15.81341	3.976608
	OPTION 3	0	0.233918	0.054717	0.233918
		2	2.076023	0.005779	0.002783
		0	0.467836	0.218870	0.467836
STATEMENT 21		3	1.929824	1.145275	0.593460
		0	0.292397	0.085496	0.292397
	OPTION 4	0	2.666666	7.111111	2.666666
		17	23.33333	44.44444	1.877934
		4	5.333333	1.777777	0.333333
		33	22.00000	121.0000	5.500000
		3	3.333333	0.111111	0.033333
	OPTION 5	0	0.842105	0.709141	0.842105
		3	7.473684	20.01385	2.677909
		0	1.684210	2.836565	1.684210
		9	6.947368	4.213296	0.606459
		6	1.05263	24.47645	23.25263
				χ^2calc =	**71.07524**

Value of the chi-square sample statistic is 71.07524.

Degrees of freedom (DF): (r-1)(c-1) = (5-1)(5-1) = 16

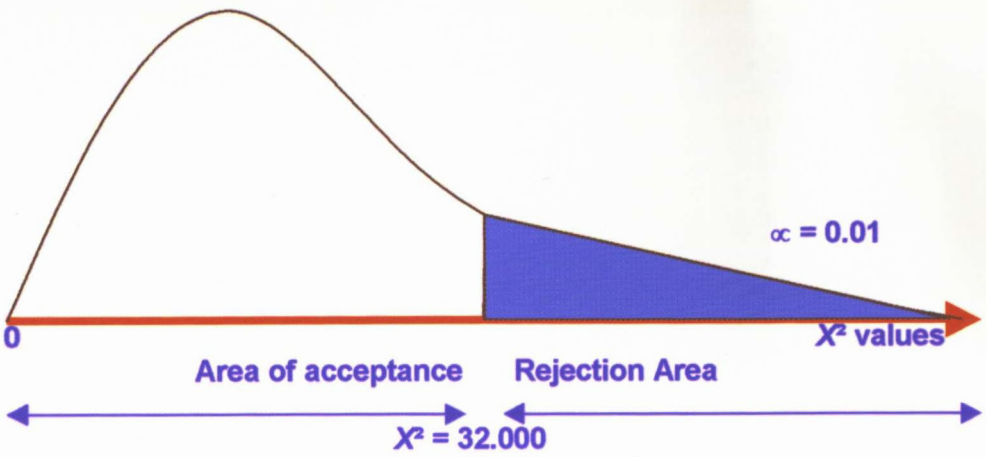
$\alpha = 0.01$

RESULTS OF THE CHI-SQUARE STATISTIC FOR STATEMENTS 21 AND 23

CHI-SQUARE	VALUE	DF	SIGNIFICANCE
Pearson	71.07525	16	0.00000
Likelihood Ratio	62.85505	16	0.00000
Mantel-Haenszel test for linear association	37.47809	1	0.00000

APPENDIX W CONTINUES

Graphically:



The decision rule is: Accept Ho if $X^2 \leq 32.000$

Reject Ho if $X^2 > 32.000$

Therefore: Accept Ho at the one percent level of significance.

CHITEST STATISTIC CALCULATIONS FOR STATEMENTS 21 AND 24

OBSERVED FREQUENCY TABLE:

THE TRAINER CONDUCTS A NEEDS ANALYSIS BEFORE IMPLEMENTING A TQM TRAINING PROGRAMME (STATEMENT 21)	THE TRAINEES HAVE NO IMMEDIATE APPLICATION FOR THE TQM TRAINING SKILLS LEARNED (STATEMENT 24)					ROW TOTAL
	OPTION 1: STRONGLY AGREE	OPTION 2: AGREE	OPTION 3: UNSURE	OPTION 4: DISAGREE	OPTION 5: STRONGLY DISAGREE	
	1.00	2.00	3.00	4.00	5.00	
OPTION 1: STRONGLY AGREE	1	2	0	13	7	23
OPTION 2: AGREE	0	13	11	25	19	68
OPTION 3: UNSURE	1	0	1	2	1	5
OPTION 4: DISAGREE	1	15	11	24	6	57
OPTION 5: STRONGLY DISAGREE	1	2	0	6	9	18
COLUMN TOTAL	4	32	23	70	42	171

EXPECTED FREQUENCY TABLE: **FORMULA:** $\frac{\text{(row total x column total)}}{\text{grand total}}$

THE TRAINER CONDUCTS A NEEDS ANALYSIS BEFORE IMPLEMENTING A TQM TRAINING PROGRAMME (STATEMENT 21)	THE TRAINEES HAVE NO IMMEDIATE APPLICATION FOR THE TQM TRAINING SKILLS LEARNED (STATEMENT 24)					ROW TOTAL
	OPTION 1: STRONGLY AGREE	OPTION 2: AGREE	OPTION 3: UNSURE	OPTION 4: DISAGREE	OPTION 5: STRONGLY DISAGREE	
	1.00	2.00	3.00	4.00	5.00	
OPTION 1: STRONGLY AGREE	0.538011	4.304093	3.093567	9.415204	5.649122	23
OPTION 2: AGREE	1.590643	12.72514	9.146198	27.83625	16.70175	68
OPTION 3: UNSURE	0.116959	0.935672	0.672514	2.046783	1.228070	5
OPTION 4: DISAGREE	1.333333	10.66666	7.666666	23.33333	14.00000	57
OPTION 5: STRONGLY DISAGREE	0.421052	3.368421	2.421052	7.368421	4.421052	18
COLUMN TOTAL	4	32	23	70	42	171

APPENDIX X CONTINUES

To derive the Chi-square sample statistic, the following chi-square formula is used:

$$\chi^2_{calc} = \sum \frac{(fo-fe)^2}{fe}$$

Where fo = observed frequency per cell

fe = expected frequency per cell

Computationally the chi-square statistics χ^2_{calc} is found as follows:

	CELL	fo	fe	(fo-fe)²	(fo-fe)²/fe
	OPTION 1	1	0.538011	0.213433	0.396707
		2	4.304093	5.307747	1.233441
		0	3.093567	9.570158	3.093567
		13	9.415204	12.85075	1.364894
		7	5.649122	1.824869	0.323035
	OPTION 2	0	1.590643	2.530146	1.590643
		13	12.72514	0.075544	0.005936
		11	9.146198	3.436578	0.375738
		25	27.83625	8.044355	0.288968
		19	15.70175	10.87842	0.692815
STATEMENT 21	OPTION 3	1	0.116959	0.779761	6.666959
		0	0.935672	0.875483	0.935672
		1	0.672514	0.107246	0.159471
		2	2.046783	0.002188	0.001069
		1	1.228070	0.052016	0.042355
	OPTION 4	1	1.333333	0.111111	0.083333
		15	10.66666	18.77777	1.760416
		11	7.666666	11.11111	1.449275
		24	23.33333	0.444444	0.019047
		6	14.00000	64.00000	4.571428
	OPTION 5	1	0.421052	0.335180	0.796052
		2	3.368421	1.872561	0.555921
		0	2.421052	5.861495	2.421052
		6	7.368421	1.872576	0.254135
		9	4.421052	20.96675	4.742481
				χ^2calc =	33.82444

Value of the chi-square sample statistic is 33.82440.

Degrees of freedom (DF): (r-1)(c-1) = (5-1)(5-1) = 16

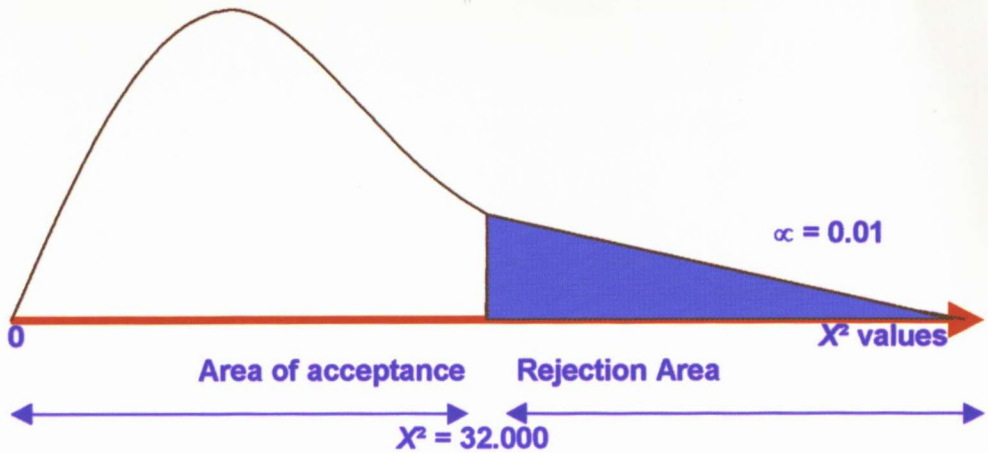
$\alpha = 0.01$

RESULTS OF THE CHI-SQUARE STATISTIC FOR STATEMENT 21 AND 24

CHI-SQUARE	VALUE	DF	SIGNIFICANCE
Pearson	33.44787	16	0.00644
Likelihood Ratio	37.04187	16	0.00207
Mantel-Haenszel test for linear association	1.49513	1	0.22142

APPENDIX X CONTINUES

Graphically:



The decision rule is: Accept Ho if $X^2 \leq 32.000$

Reject Ho if $X^2 > 32.000$

Therefore: Accept Ho at the one percent level of significance.

CHITEST STATISTIC CALCULATIONS FOR STATEMENTS 21 AND 30

OBSERVED FREQUENCY TABLE:

THE TRAINER CONDUCTS A NEEDS ANALYSIS BEFORE IMPLEMENTING A TQM TRAINING PROGRAMME (STATEMENT 21)	THE RESULT OF TQM TRAINING IS MEASURED (STATEMENT 30)					ROW TOTAL
	OPTION 1: STRONGLY AGREE	OPTION 2: AGREE	OPTION 3: UNSURE	OPTION 4: DISAGREE	OPTION 5: STRONGLY DISAGREE	
	1.00	2.00	3.00	4.00	5.00	
OPTION 1: STRONGLY AGREE	8	10	3	2	0	23
OPTION 2: AGREE	3	32	7	20	6	68
OPTION 3: UNSURE	0	2	0	1	2	5
OPTION 4: DISAGREE	1	19	10	21	6	57
OPTION 5: STRONGLY DISAGREE	0	8	0	6	4	18
COLUMN TOTAL	12	71	20	50	18	171

EXPECTED FREQUENCY TABLE: **FORMULA:** $\frac{\text{(row total x column total)}}{\text{grand total}}$

THE TRAINER CONDUCTS A NEEDS ANALYSIS BEFORE IMPLEMENTING A TQM TRAINING PROGRAMME (STATEMENT 21)	THE RESULT OF TQM TRAINING IS MEASURED (STATEMENT 30)					ROW TOTAL
	OPTION 1: STRONGLY AGREE	OPTION 2: AGREE	OPTION 3: UNSURE	OPTION 4: DISAGREE	OPTION 5: STRONGLY DISAGREE	
	1.00	2.00	3.00	4.00	5.00	
OPTION 1: STRONGLY AGREE	1.614035	9.549707	2.690058	6.725146	2.421052	23
OPTION 2: AGREE	4.771929	28.23391	7.953216	19.88304	7.157894	68
OPTION 3: UNSURE	0.350877	2.076023	0.584795	1.461988	0.526315	5
OPTION 4: DISAGREE	4.000000	23.66666	6.666666	16.66666	6.000000	57
OPTION 5: STRONGLY DISAGREE	1.263157	7.473684	2.105263	2.263157	1.894736	18
COLUMN TOTAL	12	71	20	50	18	171

APPENDIX Y CONTINUES

To derive the Chi-square sample statistic, the following chi-square formula is used:

$$\chi^2_{calc} = \sum \frac{(fo-fe)^2}{fe}$$

Where fo = observed frequency per cell

fe = expected frequency per cell

Computationally the chi-square statistics χ^2_{calc} is found as follows:

	CELL	fo	fe	$(fo-fe)^2$	$\frac{(fo-fe)^2}{fe}$
	OPTION 1	8	1.614035	40.78054	25.26620
		10	9.549707	0.202763	0.021232
		3	2.690058	0.096063	0.035710
		2	6.725146	22.32700	3.319928
		0	2.421052	5.851495	2.421052
	OPTION 2	3	4.771929	3.139735	0.657959
		32	28.23391	14.18337	0.502352
		7	7.953216	0.908621	0.114244
		20	19.88304	0.013679	0.000687
		6	7.157894	1.340720	0.187306
STATEMENT 21	OPTION 3	0	0.350877	0.123114	0.350877
		2	2.076023	0.005779	0.002783
		0	0.584795	0.341985	0.584795
		1	1.461988	0.213433	0.145988
		2	0.526315	2.171745	4.126315
	OPTION 4	1	4.000000	9.000000	2.250000
		19	23.66666	21.77777	0.920187
		10	6.666666	11.11111	1.666666
		21	16.66666	18.77777	1.126666
		6	6.000000	0.000000	0.00000
	OPTION 5	0	1.263157	1.595567	1.263157
		8	7.473684	0.277008	0.037064
		0	2.105263	4.432162	2.105263
		6	5.263157	0.542936	0.103157
		4	1.894736	4.432132	2.339181
				χ^2calc =	49.54879

Value of the chi-square sample statistic is 49.54879.

Degrees of freedom (DF): (r-1)(c-1) = (5-1)(5-1) = 16

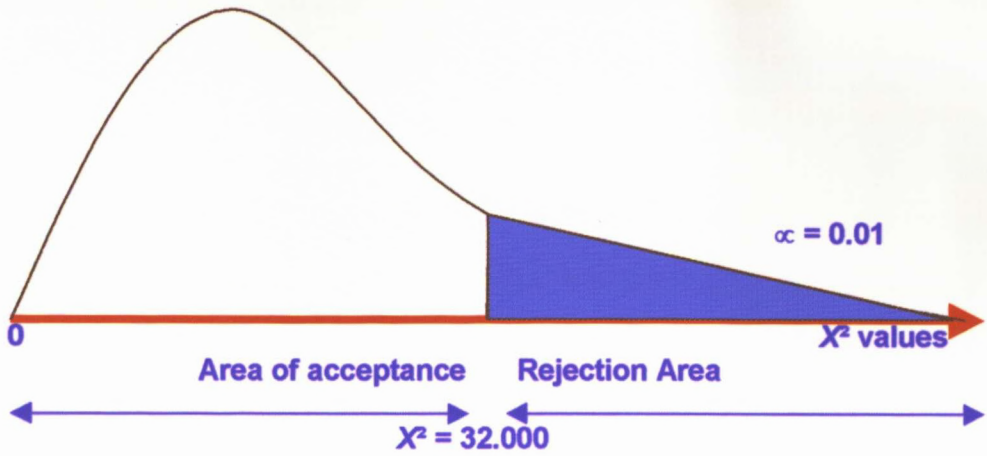
$\alpha = 0.01$

RESULTS OF THE CHI-SQUARE STATISTIC FOR STATEMENT 21 AND 30

CHI-SQUARE	VALUE	DF	SIGNIFICANCE
Pearson	49.54879	16	0.00003
Likelihood Ratio	43.66237	16	0.00022
Mantel-Haenszel test for linear association	14.59065	1	0.00013

APPENDIX Y CONTINUES

Graphically:



The decision rule is: Accept Ho if $X^2 \leq 32.000$

Reject Ho if $X^2 > 32.000$

Therefore: Accept Ho at the one percent level of significance.

CHITEST STATISTIC CALCULATIONS FOR STATEMENT 27 AND 26

OBSERVED FREQUENCY TABLE:

THE PHYSICAL WORK ENVIRONMENT SUPPORTS THE TRAINEES' SKILLS ACQUIRED (STATEMENT 27)	TRAINEES PERCEIVE TQM TRAINING AS BEING IRRELEVANT TO THEIR JOB FUNCTIONS (STATEMENT 26)					ROW TOTAL
	OPTION 1: STRONGLY AGREE	OPTION 2: AGREE	OPTION 3: UNSURE	OPTION 4: DISAGREE	OPTION 5: STRONGLY DISAGREE	
	1.00	2.00	3.00	4.00	5.00	
OPTION 1: STRONGLY AGREE	4	3	2	4	6	19
OPTION 2: AGREE	2	29	10	33	5	79
OPTION 3: UNSURE	1	7	2	9	1	20
OPTION 4: DISAGREE	2	21	4	16	1	44
OPTION 5: STRONGLY DISAGREE	2	2	0	3	2	9
COLUMN TOTAL	11	62	18	65	15	171

EXPECTED FREQUENCY TABLE: **FORMULA:** $\frac{\text{(row total x column total)}}{\text{grand total}}$

THE PHYSICAL WORK ENVIRONMENT SUPPORTS THE TRAINEES' SKILLS ACQUIRED (STATEMENT 27)	TRAINEES PERCEIVE TQM TRAINING AS BEING IRRELEVANT TO THEIR JOB FUNCTIONS (STATEMENT 26)					ROW TOTAL
	OPTION 1: STRONGLY AGREE	OPTION 2: AGREE	OPTION 3: UNSURE	OPTION 4: DISAGREE	OPTION 5: STRONGLY DISAGREE	
	1.00	2.00	3.00	4.00	5.00	
OPTION 1: STRONGLY AGREE	1.222222	6.888888	2.000000	7.222222	1.666666	19
OPTION 2: AGREE	5.081871	28.643274	8.315789	30.02923	6.929824	79
OPTION 3: UNSURE	1.286549	7.251461	2.105263	7.602339	1.754385	20
OPTION 4: DISAGREE	2.830409	15.953216	4.631578	16.72514	3.859649	44
OPTION 5: STRONGLY DISAGREE	0.578947	3.263157	0.947368	3.421052	0.789473	9
COLUMN TOTAL	11	62	18	65	15	171

APPENDIX Z CONTINUES

To derive the Chi-square sample statistic, the following chi-square formula is used:

$$\chi^2_{calc} = \sum \frac{(fo-fe)^2}{fe}$$

Where fo = observed frequency per cell

fe = expected frequency per cell

Computationally the chi-square statistics χ^2_{calc} is found as follows:

	CELL	fo	fe	(fo-fe)²	(fo-fe)²/fe
	OPTION 1	4	1.222222	7.716049	6.313131
		3	6.888888	15.12345	2.195240
		2	2.000000	0.000000	0.000000
		4	7.222222	10.38271	1.437606
		6	1.666666	18.77777	11.26666
	OPTION 2	2	5.081871	9.497930	1.868982
		29	28.643274	0.127252	0.004442
		10	8.315789	2.836565	0.341105
		33	30.02923	8.825416	0.293894
		5	6.929824	3.724228	0.537419
STATEMENT 27	OPTION 3	1	1.286549	0.082110	0.063822
		7	7.251461	0.063233	0.008720
		2	2.105263	0.011080	0.005263
		9	7.602339	1.953455	0.256954
		1	1.754385	0.569098	0.324385
	OPTION 4	2	2.830409	0.689579	0.243632
		21	15.953216	25.470024	1.596544
		4	4.631578	0.398891	0.086124
		16	16.72514	0.525837	0.031439
		1	3.859649	8.177593	2.115740
	OPTION 5	2	0.578947	2.019390	3.488038
		2	3.263157	1.595567	0.488964
		0	0.947368	0.897506	0.947368
		3	3.421052	0.177285	0.051821
		2	0.789473	1.465373	1.856140
				χ^2calc =	35.82655

Value of the chi-square sample statistic is 35.82655.

Degrees of freedom (DF): (r-1)(c-1) = (5-1)(5-1) = 16

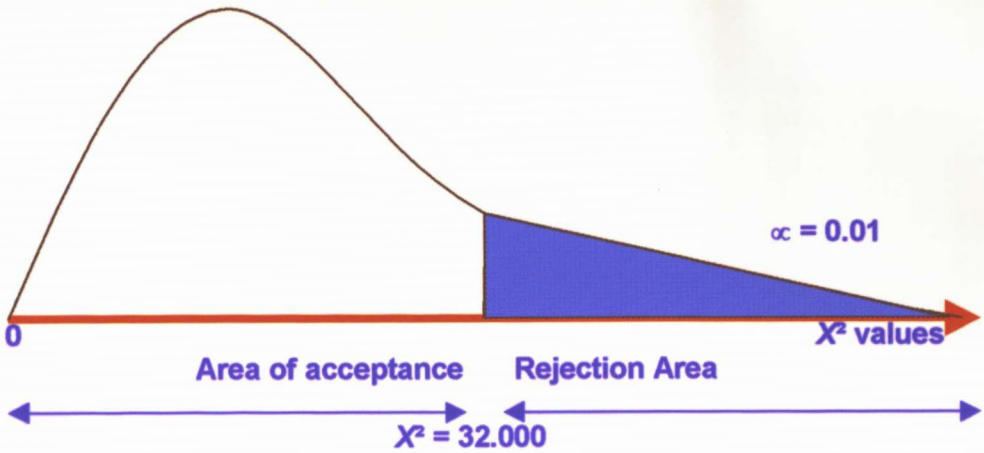
$\alpha = 0.01$

RESULTS OF THE CHI-SQUARE STATISTIC FOR STATEMENT 27 AND 26

CHI-SQUARE	VALUE	DF	SIGNIFICANCE
Pearson	35.82655	16	0.00306
Likelihood Ratio	30.28383	16	0.01658
Mantel-Haenszel test for linear association	1.56469	1	0.21098

APPENDIX Z CONTINUES

Graphically:



The decision rule is: Accept Ho if $X^2 \leq 32.000$

Reject Ho if $X^2 > 32.000$

Therefore: Accept Ho at the one percent level of significance.

CHITEST STATISTIC CALCULATIONS FOR STATEMENT 27 AND 33

OBSERVED FREQUENCY TABLE:

THE PHYSICAL WORK ENVIRONMENT SUPPORTS THE TRAINEES' SKILLS ACQUIRED (STATEMENT 27)	THE LINE MANAGER ASSISTS THE TRAINER IN PREPARING THE WORK ENVIRONMENT TO SUPPORT TQM TRAINING (STATEMENT 33)					ROW TOTAL
	OPTION 1: STRONGLY AGREE	OPTION 2: AGREE	OPTION 3: UNSURE	OPTION 4: DISAGREE	OPTION 5: STRONGLY DISAGREE	
	1.00	2.00	3.00	4.00	5.00	
OPTION 1: STRONGLY AGREE	8	8	1	1	1	19
OPTION 2: AGREE	6	42	5	25	1	79
OPTION 3: UNSURE	1	6	3	8	2	20
OPTION 4: DISAGREE	1	10	9	20	4	44
OPTION 5: STRONGLY DISAGREE	0	1	2	5	1	9
COLUMN TOTAL	16	67	20	59	9	171

EXPECTED FREQUENCY TABLE: **FORMULA:** $\frac{\text{(row total x column total)}}{\text{grand total}}$

THE PHYSICAL WORK ENVIRONMENT SUPPORTS THE TRAINEES' SKILLS ACQUIRED (STATEMENT 27)	THE LINE MANAGER ASSISTS THE TRAINER IN PREPARING THE WORK ENVIRONMENT TO SUPPORT TQM TRAINING (STATEMENT 33)					ROW TOTAL
	OPTION 1: STRONGLY AGREE	OPTION 2: AGREE	OPTION 3: UNSURE	OPTION 4: DISAGREE	OPTION 5: STRONGLY DISAGREE	
	1.00	2.00	3.00	4.00	5.00	
OPTION 1: STRONGLY AGREE	1.777777	7.444444	2.222222	6.555555	1.000000	19
OPTION 2: AGREE	7.391812	30.95621	9.239766	27.25730	4.157894	79
OPTION 3: UNSURE	1.871345	7.836257	2.339181	6.900584	1.052631	20
OPTION 4: DISAGREE	4.116959	17.23976	5.146198	15.18148	2.315789	44
OPTION 5: STRONGLY DISAGREE	0.842105	3.526315	1.052631	3.105263	0.473684	9
COLUMN TOTAL	16	67	20	59	9	171

APPENDIX AA CONTINUES

To derive the Chi-square sample statistic, the following chi-square formula is used:

$$\chi^2_{calc} = \sum \frac{(fo-fe)^2}{fe}$$

Where fo = observed frequency per cell

fe = expected frequency per cell

Computationally the chi-square statistics χ^2_{calc} is found as follows:

	CELL	fo	fe	(fo-fe)²	(fo-fe)²/fe
	OPTION 1	8	1.777777	38.71604	21.77777
		42	30.95321	122.031	3.942447
		5	9.239766	17.97561	1.945462
		25	27.25730	5.095448	0.186938
		1	4.157894	9.972299	2.398401
	OPTION 2	6	7.3941812	1.937143	0.262066
		6	7.836257	3.371840	0.430287
		3	2.33918	0.436691	0.186681
		8	6.900584	1.208713	0.175161
		2	1.052631	0.897506	0.852631
STATEMENT 27	OPTION 3	1	1.871345	0.759242	0.405720
		10	17.23976	52.41421	3.040308
		9	5.146198	14.85178	2.885971
		20	15.18128	23.21999	1.529514
		4	2.315789	2.836565	1.224880
	OPTION 4	0	0.842105	0.709141	0.842105
		1	3.526315	6.382271	1.809897
		2	1.052631	0.897506	0.852631
		5	3.105263	3.590027	1.156110
		1	0.473684	0.277008	0.584795
	OPTION 5	8	7.444444	0.308641	0.041459
		1	2.222222	1.493827	0.672222
		1	6.555555	30.86419	4.708097
		1	1.000000	0.000000	0.000000
		1	0.473684	0.277008	0.584795
				χ^2_{calc} =	54.27142

Value of the chi-square sample statistic is 54.27142.

Degrees of freedom (DF): (r-1)(c-1) = (5-1)(5-1) = 16

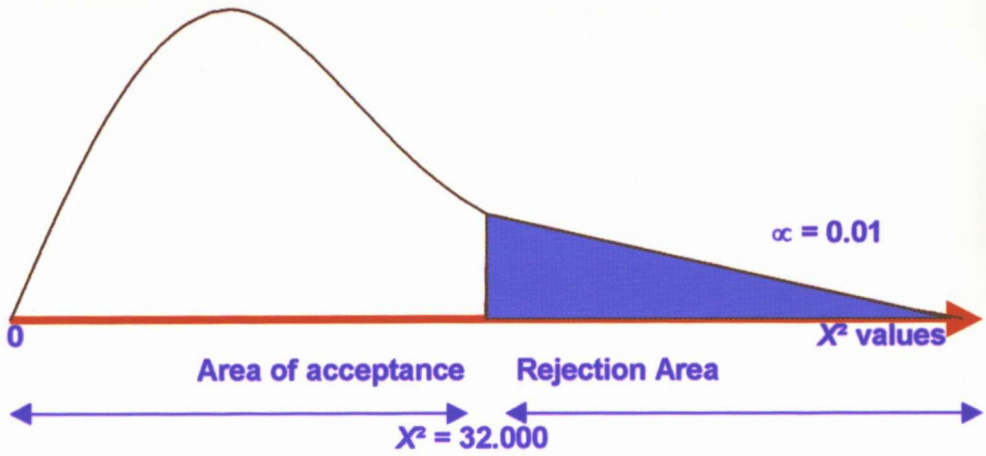
$\alpha = 0.01$

RESULTS OF THE CHI-SQUARE STATISTIC FOR STATEMENT 27 AND 33

CHI-SQUARE	VALUE	DF	SIGNIFICANCE
Pearson	54.27143	16	0.00000
Likelihood Ratio	49.68953	16	0.00003
Mantel-Haenszel test for linear association	28.34558	1	0.00000

APPENDIX AA CONTINUES

Graphically:



The decision rule is: Accept Ho if $X^2 \leq 32.000$

Reject Ho if $X^2 > 32.000$

Therefore: Accept Ho at the one percent level of significance.

CHITEST STATISTIC CALCULATIONS FOR STATEMENT 29 AND 25

OBSERVED FREQUENCY TABLE:

THE BENEFITS OF TQM TRAINING ARE ASSESSED IN THE LIGHT OF ITS OVERALL CONTRIBUTION TO THE ORGANISATION (STATEMENT 29)	THE TRAINER DETERMINES WHETHER THE TRAINEES HAVE LEARNED THE OBJECTIVES OF THE TQM TRAINING PROGRAMME (STATEMENT 35)					ROW TOTAL
	OPTION 1: STRONGLY AGREE	OPTION 2: AGREE	OPTION 3: UNSURE	OPTION 4: DISAGREE	OPTION 5: STRONGLY DISAGREE	
	1.00	2.00	3.00	4.00	5.00	
OPTION 1: STRONGLY AGREE	5	11	1	4	2	23
OPTION 2: AGREE	3	39	12	20	4	78
OPTION 3: UNSURE	0	5	4	5	3	17
OPTION 4: DISAGREE	0	13	3	22	4	42
OPTION 5: STRONGLY DISAGREE	0	2	3	3	3	11
COLUMN TOTAL	8	70	23	54	16	171

EXPECTED FREQUENCY TABLE: **FORMULA:** $\frac{\text{(row total x column total)}}{\text{grand total}}$

THE BENEFITS OF TQM TRAINING ARE ASSESSED IN THE LIGHT OF ITS OVERALL CONTRIBUTION TO THE ORGANISATION (STATEMENT 29)	THE TRAINER DETERMINES WHETHER THE TRAINEES HAVE LEARNED THE OBJECTIVES OF THE TQM TRAINING PROGRAMME (STATEMENT 35)					ROW TOTAL
	OPTION 1: STRONGLY AGREE	OPTION 2: AGREE	OPTION 3: UNSURE	OPTION 4: DISAGREE	OPTION 5: STRONGLY DISAGREE	
	1.00	2.00	3.00	4.00	5.00	
OPTION 1: STRONGLY AGREE	1.076023	9.415205	3.093567	7.263158	2.152047	23
OPTION 2: AGREE	3.649123	31.92982	10.49122	24.63157	7.298246	78
OPTION 3: UNSURE	0.795322	6.959064	2.286550	5.368421	1.590643	17
OPTION 4: DISAGREE	1.964912	17.192982	5.649123	13.26315	3.929825	42
OPTION 5: STRONGLY DISAGREE	0.514620	4.502924	1.479532	3.473684	1.029240	11
COLUMN TOTAL	8	70	23	54	16	171

APPENDIX AB CONTINUES

To derive the Chi-square sample statistic, the following chi-square formula is used:

$$\chi^2_{calc} = \sum \frac{(fo-fe)^2}{fe}$$

Where fo = observed frequency per cell

fe = expected frequency per cell

Computationally the chi-square statistics χ^2_{calc} is found as follows:

	CELL	fo	fe	$(fo-fe)^2$	$\frac{(fo-fe)^2}{fe}$
	OPTION 1	5	1.076023	15.39759	14.30971
		11	9.415205	2.511576	0.266757
		1	3.093567	4.383024	1.416819
		4	7.263158	10.64819	1.466056
		2	2.152047	0.023118	0.010742
	OPTION 2	3	3.649123	0.421360	0.115469
		39	31.92982	49.98738	1.565539
		12	10.49122	2.276393	0.216981
		20	24.63157	21.45152	0.870895
		4	7.298246	10.87842	1.490553
STATEMENT 29	OPTION 3	0	0.795322	0.532537	0.795322
		5	6.959064	3.837933	0.551501
		4	2.286550	2.935912	1.283992
		5	5.368421	0.135734	0.025284
		3	1.590643	1.986286	1.248732
	OPTION 4	0	1.964912	3.860880	1.964912
		13	17.19298	17.581102	1.022574
		3	5.649123	7.017852	1.242291
		22	13.26315	76.33241	5.755221
		4	3.929825	0.004925	0.001253
	OPTION 5	0	0.514620	0.264834	0.514620
		2	4.502924	6.264628	1.391236
		3	1.479532	2.311822	1.562536
		3	3.473684	0.224377	0.064593
		3	1.029240	3.883896	3.773558
				χ^2_{calc} =	42.92715

Value of the chi-square sample statistic is 42.92715.

Degrees of freedom (DF): (r-1)(c-1) = (5-1)(5-1) = 16

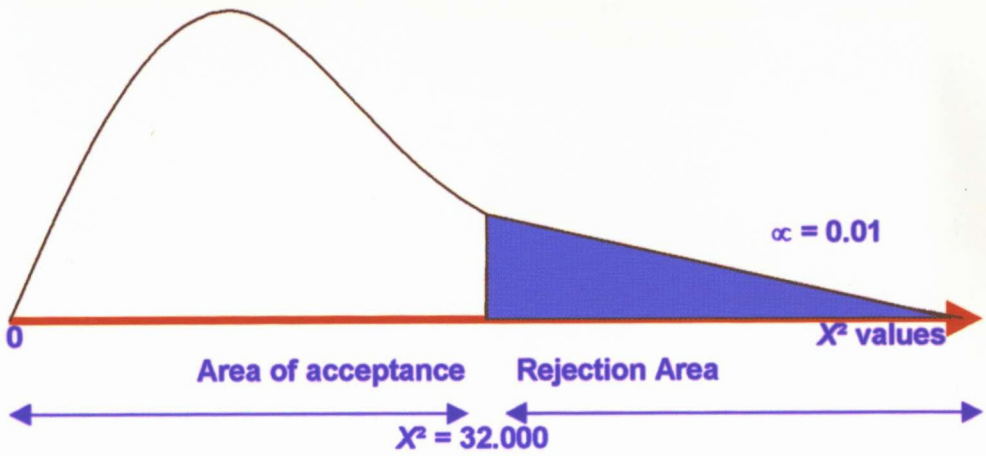
$\alpha = 0.01$

RESULTS OF THE CHI-SQUARE STATISTIC FOR STATEMENT 29 AND 35

CHI-SQUARE	VALUE	DF	SIGNIFICANCE
Pearson	42.92716	16	0.00029
Likelihood Ratio	38.10906	16	0.00146
Mantel-Haenszel test for linear association	18.01022	1	0.00002

APPENDIX AB CONTINUES

Graphically:



The decision rule is: Accept Ho if $X^2 \leq 32.000$

Reject Ho if $X^2 > 32.000$

Therefore: Accept Ho at the one percent level of significance.

CHITEST STATISTIC CALCULATIONS FOR STATEMENT 29 AND 36

OBSERVED FREQUENCY TABLE:

THE BENEFITS OF TQM TRAINING ARE ASSESSED IN THE LIGHT OF ITS OVERALL CONTRIBUTION TO THE ORGANISATION (STATEMENT 29)	THE RETURN ON TQM TRAINING INVESTMENTS DOES NOT JUSTIFY ITS EXENDITURE (STATEMENT 36)					ROW TOTAL
	OPTION 1: STRONGLY AGREE	OPTION 2: AGREE	OPTION 3: UNSURE	OPTION 4: DISAGREE	OPTION 5: STRONGLY DISAGREE	
	1.00	2.00	3.00	4.00	5.00	
OPTION 1: STRONGLY AGREE	1	1	1	9	11	23
OPTION 2: AGREE	3	12	12	40	11	78
OPTION 3: UNSURE	1	5	3	4	4	17
OPTION 4: DISAGREE	5	19	0	13	5	42
OPTION 5: STRONGLY DISAGREE	4	3	0	1	3	11
COLUMN TOTAL	14	40	16	67	34	171

EXPECTED FREQUENCY TABLE: **FORMULA:** $\frac{\text{(row total x column total)}}{\text{grand total}}$

THE BENEFITS OF TQM TRAINING ARE ASSESSED IN THE LIGHT OF ITS OVERALL CONTRIBUTION TO THE ORGANISATION (STATEMENT 29)	THE RETURN ON TQM TRAINING INVESTMENTS DOES NOT JUSTIFY ITS EXENDITURE (STATEMENT 36)					ROW TOTAL
	OPTION 1: STRONGLY AGREE	OPTION 2: AGREE	OPTION 3: UNSURE	OPTION 4: DISAGREE	OPTION 5: STRONGLY DISAGREE	
	1.00	2.00	3.00	4.00	5.00	
OPTION 1: STRONGLY AGREE	1.883040	5.380116	2.152046	9.011695	4.573099	23
OPTION 2: AGREE	6.385964	18.24561	7.298245	30.56140	15.50877	78
OPTION 3: UNSURE	1.3941812	3.976608	1.590643	6.660818	3.380116	17
OPTION 4: DISAGREE	3.438596	9.824561	3.929824	16.45614	8.350877	42
OPTION 5: STRONGLY DISAGREE	0.900584	2.573099	1.029239	4.309941	2.187134	11
COLUMN TOTAL	14	40	16	67	34	171

APPENDIX AC CONTINUES

To derive the Chi-square sample statistic, the following chi-square formula is used:

$$\chi^2_{calc} = \sum \frac{(fo-fe)^2}{fe}$$

Where fo = observed frequency per cell

fe = expected frequency per cell

Computationally the chi-square statistics χ^2_{calc} is found as follows:

	CELL	fo	fe	$(fo-fe)^2$	$\frac{(fo-fe)^2}{fe}$
	OPTION 1	1	1.883040	0.779761	0.414096
		1	5.380116	19.18542	3.565986
		1	2.152046	1.327211	0.616720
		9	9.011695	0.000136	1.517960
		1	4.309941	10.95571	2.541963
	OPTION 2	3	6.385964	11.46475	1.795305
		12	18.24561	39.00769	2.137921
		12	7.298245	22.10649	3.029014
		40	30.56140	89.08710	2.915020
		11	15.50877	20.32902	1.310808
STATEMENT 29	OPTION 3	1	1.391812	0.152517	0.110300
		5	3.976608	1.048330	0.263372
		3	1.590643	1.986286	1.248731
		4	6.660818	7.079956	1.062925
		4	3.380116	0.384254	0.113680
	OPTION 4	5	3.438596	2.437980	0.709004
		19	9.824561	84.18867	8.569204
		0	3.929824	15.44352	3.929824
		13	16.456140	11.94490	0.725863
		5	8.350877	11.22837	1.344574
	OPTION 5	4	0.900584	9.606374	10.66681
		3	2.573099	0.182244	0.070826
		0	1.029239	1.059334	1.029239
		1	4.309941	10.95571	2.541963
		3	2.187134	0.660850	0.302107
				χ^2calc =	57.50550

Value of the chi-square sample statistic is 57.50550.

Degrees of freedom (DF): (r-1)(c-1) = (5-1)(5-1) = 16

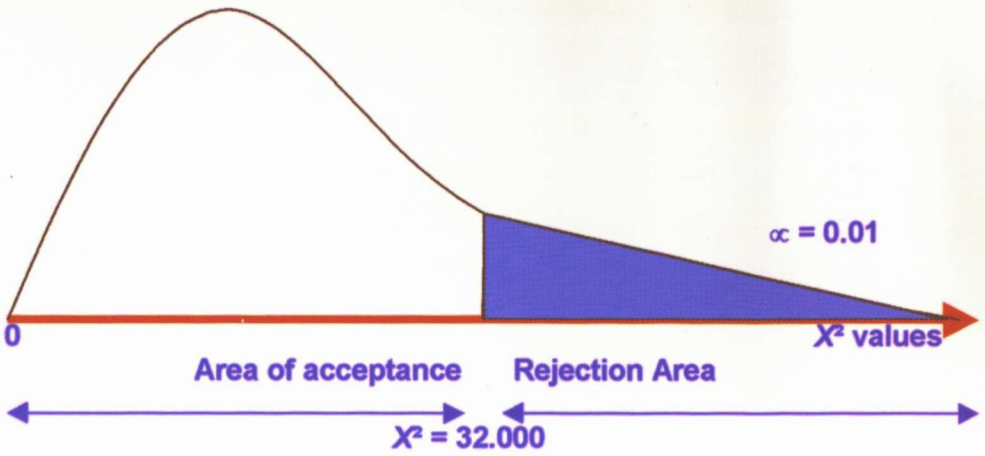
$\alpha = 0.01$

RESULTS OF THE CHI-SQUARE STATISTIC FOR STATEMENT 29 AND 36

CHI-SQUARE	VALUE	DF	SIGNIFICANCE
Pearson	57.50551	16	0.00000
Likelihood Ratio	56.51587	16	0.00000
Mantel-Haenszel test for linear association	21.72345	1	0.00000

APPENDIX AC CONTINUES

Graphically:



The decision rule is: Accept Ho if $X^2 \leq 32.000$

Reject Ho if $X^2 > 32.000$

Therefore: Accept Ho at the one percent level of significance.