

# **Chapter One**

## **Basic of the research**

### **Theme one:**

#### **Introduction:**

In today's globalized economy, competition is becoming ever more intense. Many companies are trying very hard not only to satisfy their customer's needs but where possible exceed them. This can only be achieved through cost reduction, improvement in product performance, increased customer satisfaction and a constant effort towards world class organizations. In order for companies to survive and grow in the future, it is essential that they deliver high quality of goods and services. Those that can deliver quality are the ones that will prosper in the next century.

Companies actually compete on three major issues; Quality, Price and Delivery. If the choice is to compete in the market place based on product or service price, then the level of competition is clearly defined; the low-cost provider wins. However, companies choosing the low cost approach may find themselves losing premium business to competitors while retaining the low-margin business in the long term. In fact, they are also vulnerable to any competitor who can offer value at a lower price. This is why many companies have become aware of the need to make quality is the competitive marketing strategy in a global market.

Large companies for instance, have started to implement total quality initiative in their products and services. The increasing acceptance of Total Quality Management (T.Q.M) as a philosophy of management and a way of company life has taken place for almost three decades.

Many companies understand that Total Quality Management is necessary for them to remain competitive, retaining their market share and to be able to respond to changing Many companies understand that Total Quality Management is necessary for them to remain competitive, retaining their market share and to be

able to respond to changing. The value of this research is one of the primary steps towards reaching the needs of Sudan airways that are trying to implement Total Quality Management in their business on future. It will focus on the Catering section in the ground handling directorate has faired in view of Total Quality Management as a tool in their quality journey.

Total Quality Management is not just an academic concept; it is a way of managing your business. There is no doubt that it has fundamentally altered the practice of management since the 1990s; which, concerned about people, their empowerment and enabling, and how they work together for the success of a business enterprise.

Total Quality Management, like quality, can be a confusing idea because people view it differently depending on their own point of view. People have come to realize how broad the scope of quality really is, and that quality is concerned with meeting or exceeding customer expectations. So, Total Quality Management is concerned with increased customer satisfaction, along with improved business processes.

### **1.1 Research Problems:**

1. The company's passenger dissatisfied of the services and equally the company's suppliers to fulfill its commitments.
2. Catering building was designed in traditional way there is not benefit from the most modern systems and standard design.
3. Failure to design and implement total quality management framework that fits to a specific service & production system in the catering section; instead a more generic model or a copy of a system that was successful for another organization was used.
4. Lack of top and middle management commitment, unrealistic expectation to set plan to design and implement total quality management programe.
5. Confusion, cross- functional teams are not employed, and lack of direction and purpose.

6. No targets, no attitude to attain higher productivity, lack of continuous improvement and total quality management culture among the catering staff, resistance to change and best practices of other companies are not benchmarked.
7. Inadequate attention to different CSFs/QM practices to implement T.Q.M in Sudan Airways Catering section.

### **1.2: Research questions:**

1. What is meant by TQM & its practices?
2. Which kind of T.Q.M implementation model should be adopted & developed, in order to guiding Sudan Airways' catering to implementing T.Q.M?
3. Are there any obstacles & barriers to implement & maintain T.Q.M practices?
4. Are there any amount of knowledge & information available on the stakeholder about the T.Q.M & C.I.?
5. Are there any indicators of use of Key Performance Indicators (K.P.Is)?

### **1.3 Research Hypotheses:**

1. The application of total quality management leads to retain existing customers and increase the company's customer .
2. Passenger satisfaction leads to increase the chances to select Sudan airways as carrier.
3. The role of application of total quality management and continual improvement leads to reduce costs and increase profitability.

### **1.4 The importance of research**

#### **The importance of this research in the following**

1. Develop the catering department as one of the important sources of income and the competitive advantage of companies.

2. Assists decision makers in the national carrier (Sudan air ways) on activating the role of T.Q.M in the correct of the defects and to enhance the catering section and put it on the right track.
3. Urged researchers to conduct more studies and researches on this field of study.

### **1.5 Research objectives:**

1. Providing & Maintaining safety, quality products & services to achieve an external customer satisfaction to keep their retention & loyalty.
2. Decrease costs to increase profitability.
3. Determination of the level & extent of implementation & maintain T.Q.M & C.I in Sudan airways' catering section.
4. To obtain the benefits of T.Q.M & C.I implementation on business performance.

### **1.6 Methodology:**

For the method, cases and survey questionnaire will be used; quantitative studies have to be conducted primarily on random populations of manufacturing & services companies in Sudan. The data will be analyzed using techniques available on SPSS showing shift in quality management practices in the Sudan manufacturing & Services industry; such as Hotels, Restaurants & catering. Conduct comprehensive literature review, to identify relationships of Sudanese Service Enterprises into TQM practices and examines impact on service quality, customer retention, satisfaction & raised profitability.

## **Theme two**

### **Previous studies**

#### **1. Inam Qureshi study**

The study included a definition of total quality management system, it is principles, quality pioneer and to highlight the total quality management role in raising the efficiency and effectiveness of performance in government institutions



and their impact on providing exceptional service.

It also mentioned the importance of how to measure customer satisfaction.

The study concluded that the environment and organizational culture of the public sector institutions operating in the United Arab Emirates (U.A.E) suited to the requirements of the principles of Overall quality.

The researcher followed the statistical survey method. The most prominent recommendations need to be adopted; the principles of Total quality management in the Sudanese public sector. Top management seeks to simplify procedures and provide excellent services to the public, and provide employee requirements and enhance their capability and skills in the work field.

## **2. Nihad Babekir study**

It aims to shed light on the effects of total quality management in Food products marketing and research problem concentrated on the lack of commitment to total quality management policy. The main results of the study is a high degree of awareness in the practice of marketing activity of food products to know the customers' expectations to satisfy them and also recognize the importance of a teamwork to implementation total quality management (T.Q.M).

The main recommendations are to expand the participation of employees in decision-making and work as a team to get the company to a high level of application of total quality management, in addition to support the application of the total quality management practices in all Sudanese food plants.

## **3. Al-Zahrani study**

It aims to identify the level of the knowledge concept of total quality management among workers in the information security of management programs in the Interior, Culture and Information Saudian ministries and the most important requirements that help application.

He highlighted the results of the study that most of the sample under study members agrees on their knowledge of the concept of total quality management

and the importance of information security applied to the programs and the possibility of that, but to some extent.

### **The most Prominent Recommendations of the Study**

Need to pay attention to publish comprehensive information security, program quality and stand on the obstacles that prevent it and set up training courses and workshops for employees on the application of total quality management culture.

#### **4. Awad study**

The study dealt with improving the health services of total quality management perspective through descriptive analytical method and social survey, Among the most prominent results that, the total quality management affect on improvement and sustainability of health services provided to citizens, which resulted from cooperation between workers to perform their work as a team.

#### **Among the most prominent recommendations**

Concern about improving continuity of health services by; improve the working environment, the efficiency of workers and customer satisfaction.

#### **5. Fatima Mohammed Malik study**

The most prominent objectives are to stand on the reality of the application of total quality management in the National Electricity Corporation to know the problems and the reasons that prevent the continuity of total quality management implementation at required level.

The researcher has adopted the case study method and descriptive survey, the study came out with good results and several recommendations highlighted by the implementation of employee training and concerning about it.

#### **Comment on the previous studies**

In spite of the difference between studies in the case studies, phenomenon under study, type of sample population and analysis methods but the research took many advantages such as, the concept of total quality management ,

it is objectives, principles, application , how statistical analysis of the sample field study conducted, comment on the results to draw conclusion and formulate recommendations.

In addition, most of the Total quality management research does not differ much on research methods, tools and the recommendations are look identical, even if, these recommendations related to the targeted research area, to the extent that most of them seem valid for all those who apply Total quality management in their work or will apply in the future.

**Among the most prominent recommendations in previous studies**

1. Expand the participation of workers in decision-making.
2. Work as a team to get the highest level of application total quality management and attention to training.
3. Training is neglected in most of country firms, including the airlines companies.

## **CHAPTER TWO**

### **Literature review on Total Quality Management**

#### **Theme one:**

#### **2.Total Quality Management Concept:**

In embarking on the quality journey, as with any other change management initiatives, one must first have a clear definition and an understanding of the basic philosophy being pursued. This chapter provides with an overview on various aspects of Total Quality Management (T.Q.M) relating to the research. It traces the origins of the term (T.Q.M) and describes the numerous definitions employed by academics, consultants, engineers, and practitioners. Feigenbaum and Ishikawa are perhaps the greatest contributors to the development of the term. However, the prominent quality gurus such as Deming, Juran and Crosby were those who have shaped the dimensions, practices and mechanisms which, underpin the concept of total quality management.

#### **2.1 Origins of Total Quality Management**

Quality strategy first appeared in the United States of America in the 1970s. It was concerned with customers and their perceptions of the products and services they were receiving. Under Total quality management, quality was also applied in all business functions, not just manufacturing.

Similar ideas developed in Japan, placing the emphasis on company-wide quality control and being heavily influenced by statistical methods. The Japanese culture found it necessary for top and middle management to have a good statistical understanding in order to appreciate the correct handling of data.

The development of T.Q.M in the West really took off in the 1980s and journals and books were published on the subject. This trend continues today, although is perhaps more focused on 'Excellence'.

## **2.2 History of Quality**

### **A. Inspection**

Took place mainly to ensure that the sorting of conformance and non-conformance product can be done and mostly involved visual inspection or testing of the product following manufacture.

### **B. Quality control**

It probably had its beginnings in the factory system that developed following the Industrial Revolution. Products were made from non-standardized materials using non-standardized method. The result was products of varying quality. The only real standards used were measures of dimensions, weight, and quality. The most common form of quality control was inspection made by the purchaser where poor quality product found would be separated from acceptable quality product and then would be scrapped, reworked, or sold as lower quality.

### **C. Quality assurance**

It is an emphasis of the change from detection activities towards prevention of poor quality or defects. In this stage, called Quality Assurance, it aims to provide sufficient confidence that a product or service will satisfy customers needs by performing systems audit, Failure Mode and effect Analysis, design of experiment and similar initiatives. Most of these traditional quality control measures were designed as a defense mechanism to prevent failure or eliminate defects. Other activities such as comprehensive quality manual, use of quality cost, development of process control and auditing of quality system are also developed in order to progress from quality control to quality assurance.

### **1. Total Quality Management (T.Q.M) and Excellence**

The last stage of this development, i.e. (T.Q.M), involves the understanding and implementation of quality management principles and concepts in every aspect of business activities. Utilization of these activities provides the customer with the best product or service at the lowest cost. The aim should be continued

quality improvement, which has become a critical distinction in today's competitive arena where the winning strategy is to gain customer loyalty. This is because anyone is able to produce or sell a product at a lower cost but not everyone can offer value with that product (Tang, 1995).

It will be obvious that T.Q.M originated in manufacturing industries; however, it applies today in every kind of organization, covering all products, processes, and services.

## **2.3 Principles of T.Q.M**

**There are five principles:**

### **2.3.1 Seven Elements of T.Q.M**

#### **1.The Approach**

The commitment of top management is essential to the success of T.Q.M. This requires a fundamental cultural shift from quality assurance and quality control, to a culture where the responsibility for quality is delegated. The T.Q.M ethos must be cascaded down from top management throughout the organization. This must reach outside the organization to suppliers and company dealers and agents.

#### **1. The Scope**

Total quality implies the involvement of every person and every process within an organization to satisfy their customers. It is company-wide. Total quality management is the means by which total quality is achieved. Individual departments must work together to achieve total quality. Attempts to make changes in one area in isolation can actually make the situation worse in other areas. What are required are co-operation, communication, and not competition between departments.

#### **2. The Scale**

Everyone in the organization has a personal responsibility for quality and customer satisfaction. This is true even for people who do not have direct contact

with external suppliers and customers. This concept of internal customers and suppliers is fundamental to the philosophy of TQM.

Hence internal customer–supplier chains can be formed throughout the whole organization. This personal responsibility gives pride in the work and job satisfaction for individuals. This in turn encourages all employees to identify and tackle the problems in their own areas.

### **3. The Philosophy**

1. The philosophy aims at prevention not detection of errors or defects. It recognises that quality cannot be inspected into a product or service. This leads to a continual seeking to improve all processes in order to avoid errors and defects.
2. This means that the time a manager spends overcoming immediate problems (‘fire fighting’) is reduced. This leaves the manager more time to seek further improvements.
3. The manager’s use of time will have changed from fire fighting to that of process improvement with consequent reductions in costs, waste and lead times.

### **4. The Standard**

People cannot just be told to get it right first time. However if they are provided with management commitment, encouragement, the right tools and resources, and above all appropriate training, then the resulting changes in attitudes will promote a ‘right first time’ culture.

### **5. The Control**

The ‘cost of quality’ statement is a main measure of quality improvement. By increasing the percentage of costs that are given to the prevention of errors and defects the percentage of failure costs reduces and therefore the overall costs reduce as well.

## **6. The Theme**

Total quality is a road not an end. It embodies the theme of continuous improvement. In TQM people are empowered to take ownership of their own quality situation, and teamwork is particularly important.

### **2.3.2 Core Principles of TQM**

1. Customer satisfaction.
2. Continuous improvement.
3. Commitment of the entire workforce.

#### **1: Customer Satisfaction:**

In order to achieve customer satisfaction, customer needs must be identified, met and the results measured as a basis for ongoing improvement. It can be argued that any organization should seek:

- A. To satisfy customers.
- B. To achieve higher customer satisfaction than its competitors.
- C. To retain customers, even if they complain.

#### **1. 1 Type of customers:**

In addition to the people external of the organization, the consumers we classically call customers, there is also the notion of the internal customer, the person working within the organization and the role played by the suppliers.

#### **A. Suppliers as Customers:**

If a true total quality environment is to be created, then consistency of high quality inputs, service or products depends intrinsically on the consistency of high quality inputs in the form of components or materials. It is vital eventually to integrate the suppliers of the organization within this cultural development in order to create a mutually beneficial relationship. In the first instance it is important to ensure that both parties clearly articulate their needs and expectations in order that quality specifications can be met.



## **B. External Customers**

Customers come from a variety of sources and their needs and wants will relate directly to their purpose for buying. In considering customers, our first thoughts tend to go to the direct customers, those who purchase the service or goods directly; but there are a number of other customer groups who also need consideration, as follows.

## **C. Intermediary Customers**

These customers purchase the service or product on behalf of somebody else. In order to make that transaction as smoothly as possible the intermediary customers themselves are likely to have their own requirements of the product or service and its accessibility.

## **D. Internal Customers**

The notion of considering the people within the organization as customers highlights the difference in the ways external and internal customers are treated despite the fact that the organization is equally dependent on both.

By seeking the information in this face-to-face way an organisation is demonstrating its commitment to listening to the people it values. A total quality approach requires customers to be identified, both internally and externally and for the organisation to appreciate the significance of the customer–supplier chain. Customer satisfaction results from the provision of products or services that meet or exceed customers' needs.

The Management and Control of Quality, present a 'customer-driven quality cycle'. The expected quality is what the customer assumes will be provided by the supplier. The supplier identifies the customer needs and produces the specification for the product or service. The output process produces a product or service, which has an actual quality. This may be different from the expected quality. The customer, on seeing the actual product or service, has a perception of the quality at this stage, and this could be different from the expected quality. In focusing on quality, it is the customer's perception that is important.

Too often suppliers ignore the customer's perception of quality. A total quality approach takes this into account and seeks to meet or exceed customer expectations.

Note: If actual quality is the same as expected quality, then the impact on the customer is likely to be zero. Customers' perceptions are generally only influenced where actual quality exceeds, or fails to meet, expected quality.

## **2. Continuous Improvement:**

Continuous improvement is a sustained effort to align the performance of an organization with its promises; the promises made to its customers, itself and its employees.

A key principle of TQM is that improvement should never end. Once an organization stops looking for better ways of doing things it ceases to progress and therefore stagnates. From a competitive point of view, this can be disastrous. Other manufacturers or service providers may soon overtake you. Organizations that truly adopt the principles of TQM look for improvement on a continual, never-ending, basis.

The sequence (**Evaluate, Plan, Do, Check, and Amend**), is a continuous process and will lead to a climate of continuous improvement within the organization.(diagram2.5,6)

The following list illustrates the wide variety of improvement tools and techniques available:

### **Some Tools and Techniques for Continuous Improvement**

- I. New product life cycle.
- II. Process Planning.
- III. Benchmarking.
- IV. Quality circles.
- V. Critical success factors.

VI. Brainstorming.

VII. Cause and effect diagrams.

**Continuous improvement can be looked at in many different ways:**

1. Ensuring that variation in a quality characteristic is continuously reduced.
2. Ensuring that processes are constantly reviewed to identify and remove sources of error.
3. Ensuring that all opportunities for process improvement, no matter how small, are implemented as quickly as possible.
4. Ensuring that customers' rising expectations are recognized and met or exceeded.
5. The Japanese have a word for continuous improvement; they call it 'Kaizen'. Instead of waiting for large, innovatory steps (new machine, new technology, new system) to improve a process, they encourage their people to find and implement small step improvements. The cumulative effect of such small steps can equal or exceed the value of one innovatory step. By implementing a few large steps and many small steps, the improvement process is both continuous and accelerated. Masaaki Imai was responsible for developing this concept within Japanese industry. This is illustrated in Diagram 2.4. Comparisons between Innovation and Continuous Improvement

**2. Commitment:**

This requires first a commitment to total quality from all levels including the very top of an organization, which then has to be shared across the whole of the organization. Top management must co-ordinate the development of a clear vision, set out measurable objectives and provides a viable organizational structure with the provision of adequate resources.

The commitment to total quality cannot be delegated from the chief

executive solely to someone lower down in the organizational structure. The chief executive must be fully committed and remain active in total quality.

### **2.3.3 Key Elements of TQM:**

1. Quality awareness. The entire organization needs to be made aware of the need for quality.
2. Management leadership. The management tiers have to demonstrate their commitment to quality and lead by example.
3. Organizing for quality improvement. In line with management commitment, the organizational systems need to be changed to be conducive to quality.
4. Creating participative environments. People need to feel that they are able to contribute towards improvements.
5. Training for quality improvement. Management must ensure that all staff has the skills and abilities to contribute effectively.
6. Involvement of every function at all levels. Management need to ensure that all staff at all levels throughout the organization is involved.
7. Customer and supplier involvement. Determine what the customers' and suppliers' needs and expectations are for both internal and external customers. Even unrealistic expectations need to be dealt with.
8. Problem prevention and solving. Attack the sources of any difficulties rather than try to remedy the results.
9. Statistical process control. Introduce the use of statistically valid methods of ensuring the accurate control of processes.
10. Measurement of quality performance. Integrate indicators of how well people are doing and feed this back to them.
11. Recognition for achievement. Reward those who have achieved not just those who manage them.
12. Continuous improvement. Develop a culture for total quality and continuous

improvement.

### **2.3.3 Benefits of TQM**

The benefits of TQM include:

1. Reduced costs.
2. Quality matched to the end customer's requirements.
3. An empowered workforce.
4. Shared responsibility for success.
5. A marketing advantage.
6. A customer-driven organization.
7. Meeting the competition.

It should be noted that savings from TQM programmes are only achieved in the long term, typically two to three years into any programme.

### **2.3.5 Barriers to TQM:**

Surveys have shown that the following can act as barriers to successful TQM implementation:

1. Instability and mobility of top management.
2. Chief executive officer not committed.
3. Inflexible culture.
4. Lack of automation of process inspection and control.
5. Lack of understanding of what TQM was, particularly on catering section.
6. Business as usual, no need for change.
7. Poor communication.
8. Lack of education and training.
9. Attitude to customer not clear.

10.Lack of mechanisms for empowering employees.

11.Insufficient wages and salaries.

## **2.4 Total Quality Management (T.Q.M) Definitions:**

From the very early days, T.Q.M has meant different things to different people. Some have treated it largely as a motivational campaign aiming to improve service to external customers. Others have focused on internal training as a way of motivating and giving people tools to undertake improvement activities. Many have identified that beyond training, teamwork and the use of statistical techniques there is, in T.Q.M, the quest for the self-improving organization.

While cultural change, organizational change, and the use of quality tools, together with a documented quality system, all have a part to play, T.Q.M is a complete management philosophy which may require a refocus and redirection of the business,(depending on what the business was like before).

The following quotes illustrate the different things that T.Q.M means to different people: ‘Total quality management is continuously satisfying customer requirements, at lowest cost, by harnessing the commitment of everyone in the organization.’

### **Total Quality Management:**

Total quality management is an approach to improve the effectiveness and flexibility of business as a whole. It is essentially a way of organizing, involving the whole company, business or organization, every department, every activity, every single person at every level.

T.Q.M is a corporate business management philosophy, which recognizes that customer needs and business goals are inseparable.

T.Q.M is applicable to both industry and commerce and the public sector. It ensures maximum effectiveness and efficiency within a business and secures commercial leadership by putting in place processes and systems that will promote excellence, prevent errors and ensure that every aspect of the business is

aligned to customer needs and the advancement of business goals without duplication or waste or effort.

Commitment to T.Q.M should originate at the chief executive level in a business and be promoted in all human activities. The accomplishment of quality is thus achieved by personal involvement and accountability, devoted to a continuous improvement process, with measurable levels of performance by all concerned.

It involves every department function and process in a business and the active commitment of all employees to meeting customer needs.

**Other quotes are:**

In general total quality management is defined as follows:

**Quality:** Is to satisfy customer's requirements continually.

**Total quality:** Is to achieve quality at low cost.

**Total quality management:** Is to obtain total quality by involving everyone's daily commitment.

‘TQM is a way of managing to improve the effectiveness, flexibility and competitiveness of a business as a whole. It applies just as much to service industries as it does to manufacturing. It involves whole companies getting organized in every department, every activity and every single person at every level.

‘An approach for continuously improving goods and services which requires the full participation of all levels and functions of an organisation. It aims to satisfy the needs of customers at lowest cost.’

**Total:** means that everyone in the organization is involved in the final product or service to the customer.

**Quality:** means conformance to requirements.

**Management:** T.Q.M is a managed process, which involves people, systems

and supporting tools and techniques. T.Q.M is therefore a change agent which is aimed at providing a customer - driven organization.'

‘All things that we must do to achieve quality leadership. ’

‘TQM is an overall umbrella term which embraces customer service, quality assurance, quality circles, and quality tools. It is a change from an output organization to a process organization. It is total involvement to delight customers.’

## 2.5 Dimension of Quality

In order to link the user criteria to the engineer design, Garvin (1988) argued for an understanding of the elements (or dimensions) of quality as perceived by the user. The criterion Garvin used for defining the eight dimensions was that the ranking could be high on one dimension and low on the other; that is the company could choose to make tradeoffs between these elements. He defined the eight dimensions a

- 1 **Performance:** refers to the primary operating characteristics of the product or service; they are usually measurable. Features - are additional characteristics that enhance the product or service appeal to the user.
- 2 **Reliability** - of a product is the likelihood that a product will not fail within a specified time. This is a key element for users who need the product to work without fail.
- 3 **Conformance:** is the precision with which the product or service meets the specified standards.
- 4 **Durability:** measures the length of a product's life.
- 5 **Serviceability:** is the speed with which the product can be put into service when it breaks down, as well as the competence and behaviour of the service person.
- 6 **Aesthetics:** is a subjective dimension indicating the kind of response a user



has to a product. It represents the individual's personal preference – the ways an individual responds to the look, feel, sound, taste, and smell.

- 7 Perceived quality:** is also a subjective dimension: it is the quality attributed to a product or service based on indirect measures. The eight dimensions described by Garvin were not directly applicable to service.

A study done by Berry, Zeithaml, and Parasuraman (1990) identified five principal dimensions in order of relative importance, these are:

- 1. Reliability of service:** is the ability to perform a service reliably and dependably. Garvin would define this dimension as conformance.
- 2. Responsiveness:** is the willingness to help customers and provide prompt service.
- 3. Assurance:** is the ability to communicate to the customer a level of competence and to provide the service with necessary courtesy.
- 4. Empathy:** is the approachability and the ability to communicate with and understand the customer's needs.
- 5. Tangibles:** are the appearance of the physical facilities, equipment, personnel, and communications materials

**Theme two:**

## **2.6 THE QUALITY GURUS:**

To the cynical observer it may seem that every few years a different guru becomes flavor of the month, offering little more than a new set of slogans for businesses to adopt. Separate marketing of the gurus has led to a lack of comparison between them. The information, which is available, is often limited or confusing. The belief is therefore encouraged that you can only follow the teachings of one guru.

In contrast to this approach, TQM emphasizes management best practice as appropriate within each company rather than allegiance to a single guru.

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appropriate within each company rather than allegiance to a single guru.

These gurus cover both the development of philosophy and tools.

These tools include technical ones such as those developed by Shingo, Ishikawa and Taguchi.

They also include management tools to achieve quality, such as the ‘zero defect’ approach of Crosby and the concepts of company-wide and total quality associated with Ishikawa and Feigenbaum.

### **2.6.1 There are Three Groups:**

Three clear groups of quality gurus can be identified covering the period since the Second World War:

1. The early Americans who, took the messages of quality to the Japanese.
2. The Japanese who, developed new concepts in response to the Americans’ messages.
3. The new Western wave of gurus who, following Japanese industrial success, have given rise to increased quality awareness in the West.

#### **I. The Early American:**

The Americans were themselves effectively responsible for making possible the miraculous turnaround of Japanese industry and for putting Japan on the road to quality leadership. Much of this transformation was associated with the rebuilding of the Japanese infrastructure after the Second World War and the introduction of statistical quality control into Japan by the US Army over the period 1946–1950 and the visits by three American quality gurus in the early 1950s.

**These early Americans were:**

1. W. Edwards Deming.
2. Joseph M. Juran.
3. Armand V. Feigenbaum.

### **A. W. Edwards Deming:**

Born in 1900, W. Edwards Deming was awarded his doctorate in mathematical physics in 1928. He then worked in the U.S Government Service for many years, particularly in statistical sampling techniques.

W. Edwards Deming introduced concepts of variation to the Japanese and a systematic approach to problem solving, which later became known as the Deming wheel or **Plan, Do, Check and Act (P.D.C.A)** cycle. Later in the west, he concentrated on management issues and produced his famous 14 points. He remained active until his death in 1993 and he attempted a summary of his 60 years' experience in his system of profound knowledge<sup>11</sup>.

### **The PDCA Cycle (Diagram 2.3).**

#### **2. Deming's philosophy was built on the need for the organization's commitment to achieve the fourteen principles, namely:**

1. Identify and disseminate the objectives and purposes of the organization:  
Must adhere to the organization identify its objectives and goals and constantly publish those purposes through its mission to interested as customers and suppliers, employees, community members and even be known by everyone.
2. Adopt a new philosophy: All employees from senior management to the lowest level of the staff to learn the concept of total quality management occurs. The organization's management that focuses on the prevention of the occurrence of errors more than an attempt to focus on the discovery of errors.
3. The new philosophy based only on the basis of achieving the highest quality and make improvements on an ongoing basis.
4. Cease dependence on inspection to achieve quality; eliminate the need for mass inspection by building quality into the product.
5. End awarding business on price; instead minimize total cost and move towards single suppliers for items.

6. Improve the system of production and service constantly: Building quality in every activity and every process and this requires cooperation between offers the service of any organization and receives service any client rests with management responsibility for solving problems and reducing the deviations in performance through the use of statistical methods known.
7. Institute training on the job: The training includes techniques to improve quality and to develop the skills of workers; Deming emphasized the need to adopt modern methods of training to serve the process of transition to total quality management.
8. Institute leadership Active management has knowledge of the nature of the work and the environment surrounding the work administration is effective no appropriate conditions for creativity and encourages suggestions and interest to provide the necessary incentives in this area.

The good leaders is support his staff and seeks to their development and improve their skills so that they can perform their work properly and a good leader always trying to continue improve and remove obstacles that hinder the progress of the process improvements in the organization.

1. Drive out fear: Management encourages effective communication between them and the workers, which creates a good atmosphere for renewing and conditions suitable to solve problems. Japanese is that the error is a treasure because they contend that the failure or mistakes are opportunities for the development and improvement. Drive out fear of discovery problems or make the required changes could eliminate the concept of improvement and development.
2. Break down the barriers between departments; research, design, sales and production must work together to foresee problems in production and use.
3. Remove barriers that rob people of their right to pride of workmanship, hourly workers, management, and engineering; eliminate annual or merit ratings and management by objective.

4. Eliminate slogans, exhortations and numerical targets for the workforce, such as ‘zero defects’ or new productivity levels. Such exhortations are diversionary as the bulk of the problems belong to the system and are beyond the power of the workforce.
5. Avoid specify numerical targets for workers: The numerical goals before the worker seeks to achieve in order to lead to a focus group to achieve the quantity rather than quality, and; encourages the production in large quantities without paying attention to the quality of the product.
6. Encourage learning and self-development: Management encourages learning and self-development for workers so as, to give workers better skills and more knowledge to enable them to perform their best work.
7. Change appropriate to push the process of transformation: Make the appropriate changes in the organizational structures of the organization in order to apply the concept of total quality management and increased attention to form work teams and increase coordination and cooperation between the administrative divisions. Also must make the change in the organizational culture in order to fit the new philosophy regarding the application of T.Q.M.

### **1 Deming’s Deadly Diseases:**

Two of Deming’s ‘deadly diseases’ were considered as perhaps only applying to US industrial companies. These were ‘**excessive medical costs**’ and ‘**excessive costs of liability**’. Those ‘deadly diseases’, which are seen to have wider application for Western and world business are given below:

1. A lack of constancy of purpose.
2. Emphasis on short-term profits.
3. Evaluation of performance, merit rating or annual review.
4. Mobility of management.
5. Management by use only of visible figures, with little or no consideration of

unknown or unknowable figures.

## **1 Profound Knowledge:**

1. Appreciation for a system. This emphasizes the need for managers to understand the relationships between functions and activities. Everyone should understand that the long-term aim is for everybody in the system to gain – employees, shareholders, customers, suppliers and the environment. Failure to accomplish the aim causes loss to everybody in the system.
2. Knowledge of statistical theory. This includes knowledge about variation, process capability, control charts, interactions and loss function. All these need to be understood to accomplish effective leadership, teamwork, etc.
3. Theory of knowledge. All plans require prediction based on past experience. An example of success cannot be successfully copied unless the theory is understood.
4. between people must be used for optimization by leaders. People have intrinsic motivation to succeed in many areas. Extrinsic motivators in employment may smother intrinsic motivation. These include pay rises and performance grading, although these are sometimes viewed as a way out for managers.

## **2. Joseph M. Juran:**

Joseph M. Juran focused on quality control as an integral part of management control in his lectures to the Japanese in the early 1950s. He believed that quality does not happen by accident, it must be planned, and that quality planning is part of the trilogy of planning, control and improvement. He warned that there are no shortcuts to quality.

Juran sought to improve quality by working within organizations rather than by any major cultural change; with the focus being on top management commitment and the need for continuous improvement in quality.

Juran defined quality as ‘fitness for use’ for both goods and services. He recognized that there was a lack of understanding in an organization as to what ‘fitness for use’ actually meant, and he then substituted an alternative goal – quality specifications of various sorts. This provided people with understandable goals which when achieved would result in the goods and services being fit for use. In addition, the concept of specifications enabled the quality activity to be integrated by the operational people into their working activities. Operators and customer facing staff were trained to interpret the specifications and using various means could form a judgment as to whether or not the goods or services conformed to specification.

### **3 The Quality Trilogy:**

Juran focused on what he calls ‘the quality trilogy’, which consists of:

1. Quality planning – the process of mapping out how to meet quality goals.
2. Quality control – the process of achieving the quality goals during the operation phase.
3. Quality improvement – the process of breaking through to new and higher levels of performance previously unheard of

### **4: Jurán’s Quality Planning Road Map:**

1. Identify who the customers are.
2. Determine the needs of those customers.
3. Translate those needs into our language.
4. Develop a product that can respond to those needs.
5. Optimize the product features to meet our needs as well as customer needs.

## **Diagram 2.1 the Quality Spiral**

### **c.Armand V. Feigenbaum**

Armand V. Feigenbaum is the originator of total quality control. He sees quality control as a business method rather than a technical one, and believes that quality has become the single most important force leading to organizational success and growth.

## **II. The Japanese:**

The Japanese adopted and adapted the methodologies that the Americans brought in and by the late 1950s had begun to develop clearly distinctive approaches suitable for their own culture.

The Japanese gurus emphasized mass education, the use of simple tools and teamwork. All had a strong background in technical education. The three Japanese quality gurus included in this module are:

1. Dr. Kaoru Ishikawa.
2. Dr. Genichi Taguchi.
3. Shigeo Shingo.

### **1. Dr. Kaoru Ishikawa**

Dr. Kaoru Ishikawa's three main contributions to quality were the simplification and spread of technical statistical tools (the 'seven tools of quality control') as a unified system throughout all levels of Japanese companies, his input to the company-wide quality movement and his input to the quality circle movement. Cause and effect' diagram, it is also called the 'Ishikawa' diagram after its originator. (You may also know it as the fishbone diagram because of its appearance.)



## **The Fish bone diagram; Diagram (2.2).**

### **2. Dr. Genichi Taguchi:**

Dr. Genichi Taguchi developed a methodology for minimum prototyping in product design and troubleshooting in production.

### **3. Shigeo Shingo:**

Shigeo Shingo created the poka-yoke or 'mistake proofing' system to ensure zero defects in production by preventive measures.

## **III. The New Western Wave:**

Much of the increased awareness of the importance of quality in the West in recent years has been associated with a new wave of gurus who have well publicized some of the quality issues, through the 1970s to the 1990s.

### **The three included here are:**

#### **1. Philip Crosby:**

Is perhaps best known in relation to the concepts of 'do it right first time' and 'zero defects'. He is a controversial figure, who has based his quality improvement approach on 'four absolutes of quality management' and 'fourteen steps to quality improvement'.

#### **Right first time:**

This is the main theme of quality control and achieve by following a set of plan. This plan can be broken into a number of stages:

1. Set the quality standard or quality of design which is required by the customer;
2. Plan to achieve the required quality by planning the methods to be used, choosing the right equipment, obtaining the right materials, training the operators, and planning the inspection procedures;
3. Make sure that each manufacturing stage produces 'right first time' i.e. zero defect rate;

4. Correct any shortcomings – this needs effective feedback;
5. Provide a coherent long-term quality plan.

This means that there must be a control system, which may be described as follows:

- a. There is a plan for quality,
- b. The company (i.e. the people in the company) are prepared to follow the plan;
- c. The actual results compared with those predicated;
- d. If deviation from the plan is seen, feedback is immediate and effective so that output again follows the predicted plan.

## **2. Tom Peters:**

**He** emphasizes the importance of customers, innovation, people, leadership, and systems. He has ‘45 prescriptions’ and ‘12 traits of a quality revolution’.

## **3. Claus Moller**

**He** developed a concept of personal quality on which he sees all other concepts of quality being based. He provides ‘12 golden rules’ to help improve an individual’s performance level, and ‘17 hallmarks of a quality company’.

## **2.6 Comparisons between Japanese and American T.Q.M:**

Feigenbaum (1956, 1961) was the first author who used the term T.Q.C. In his first book on T.Q.C (Feigenbaum, 1961) (a revision of the book original published under the title “Quality Control” in 1951), he defined T.Q.C as “an effective system for integrating the quality-development, quality maintenance, and quality-improvement efforts of the various groups in an organization so as to enable production and service at the most economical levels which allow for full customer satisfaction”. He considered that “control must start with the design of the product and end only when the product has been placed in the hands of a customer who remains satisfied.”

In this book, Feigenbaum recognized that all departments in a company have

some responsibility for the achievement of quality, as it was originally perceived by. However, T.Q.C did not include many of the elements (e.g. supplier developmental relationships, people empowerment, and teamwork) that are not considered part of the T.Q.M concept.

Japanese companies have developed their own approach to T.Q.C, based on the teachings of Deming and Juran, shaping it to suit their own culture and operating Japanese companies have developed their own approach to T.Q.C, based on the environment along with the development of a new set of tools, techniques, and operating systems.

In the authors' opinion Ishikawa was mainly responsible for shaping Japanese style total quality control (T.Q.C). His definition of T.Q.C or Company Wide Quality Control (C.W.Q.C) is; products and services with optimum cost-effectiveness and usefulness, which customers will purchase with satisfaction. To achieve these aims, all the separate parts of a company Analyzing Feigenbaum's and Ishikawa's definitions, it can be seen that there are no major differences.

However, Ishikawa (1985) is of the view that the difference between C.W.Q.C and Feigenbaum's approach is that, whilst Feigenbaum advocates that T.Q.C is conducted essentially by Q.C specialists, C.W.Q.C has never been an exclusive domain of such specialists.

Indeed analyzing the work of Feigenbaum (1961), it can be seen that the focus on the participation of employees is weak and the task of improving quality is given to managers. According to Garvin (1988), the term companywide quality control (C.W.Q.C) was introduced in Japan in 1968, some ten years after Feigenbaum introduced the Quality control is seen as entering into all phases of the industrial production process, from customer specification and sale through design, engineering, and, assembly and ending with shipment of product to a customer who is happy with it. Effective control over the factors affecting product quality regarded as requiring controls at all important stages of the production process.

## **Chapter Three**

### **3. Basic Implementation of T.Q.M:**

#### **Theme one:**

#### **3.1 Implementation stages of T.Q.M Programme:**

Implementing T.Q.M Programme assumes that a programme has been produced, and a plan of action put in place to introduce this programme into the organization.

The following stages, and their effectiveness in implementation, will depend largely upon the culture of the organization in which the TQM programme is being introduced.

##### **3.1.1 First stage: Understanding Quality:**

The preliminary stage of understanding quality is vital since it is the basis on which all the subsequent stages depend.

##### **3.1.2 Second stage: Commitment and Leadership:**

Is moving from understanding quality to top management commitment. Juran knew that getting any form of quality improvement started in an organisation was not easy. In order to capture the attention of senior management he used to put forward quality improvements in the 'language of money'. In talking about presenting the need for quality improvement to senior management, Juran said that it was too often presented in the language of things.

This commitment must be translated into plans and actions, within a clear strategy, which will enable a (T.Q.M) programme to be implemented. This is where leadership is vital. The chief executive officer (C.E.O) must take the lead in showing commitment to the TQM programme. Because of the C.E.O's other responsibilities, the task of establishing and running the implementation programme may be given by the CEO to another senior manager.

Once this commitment of the CEO has been established, and the leadership

of the TQM programme set up, a move can be made to the next stage of implementation.

### **3.1.3 Third stage: Planning:**

It should be noted that some of the steps given in this planning stage may have already been carried out in order to present to the CEO a case for introducing a TQM implementation programme.

Juran, has made very clear the importance of planning for quality improvement. A great deal of effort must be put in to establish exactly where an organisation is in relation to TQM. It is said that over 70% of TQM initiatives in the world eventually fail. It is useful to consider it at this planning stage to prevent the most critical steps being missed out of the TQM programme you intend to introduce into your organisation.

### **3.1.4 Stage forth: Project Team:**

Regard the TQM implementation programme as a project. A project team should be set up capable of using, or being trained to use, project management tools and techniques. Also the personal characteristics of the individual members of the project team should be assessed to ensure that the team functions as an effective and efficient group.

### **3.1.5 Stage fifth: Process Documentation:**

From the organization's vision, mission and critical success factors select a number of key business processes, which contribute to the success of the company. Limit this number to five or six when introducing a TQM implementation programme for the first time.

For the sake of clarity and understanding, it will be useful to give definitions of what is meant by vision, mission, and critical success factors.

1. **Vision:** A statement that describes the desired future position of the company.

For example, 'We will become a world-class provider of consultancy services'.

2. **Mission:** A statement that describes the purpose of the organisation. For example, ‘We provide cost-effective consultancy services that delight our clients and cause measurable improvements in their business’.
3. **Critical success factor:** A statement describing a characteristic of the business which, if not delivered, would cause the non-achievement of either the vision or the mission. For example, a business becomes complacent and as a result ceases to be a ‘world-class’ or ‘cost-effective’ consultancy.

The steps that are needed in a process-mapping activity can be defined as follows:

1. Identify the customers of the process.
2. Determine the customer requirements for the process outputs.
3. Determine the measures.
4. Analyze the activities that produce the process outputs.
5. Determine the input requirements.
6. Identify the suppliers to the process.

### **3.1.6 Stage six: Quality Costs:**

Information on quality costs can often be used as a means to influence top management to introduce a quality improvement activity.

### **3.1.7 Stage seven: Customer Satisfaction:**

- This is a vital factor in any assessment of where an organisation stands in respect to T.Q.M.
- There are a number of ways of eliciting customer satisfaction levels; which method you select will be dependent on a number of factors:
  1. How big is your **customer base**? If it is very large, then you will need to determine a sample frame of customers from whom to elicit views. If it is small, it may be viable to elicit the views of the entire customer

population.

2. How specific your **information requirements** are. If you need to elicit the satisfaction levels pertaining to specific criteria, then the methodology selected will need to be amenable to being highly structured.
3. The amount of **resources available** for primarily eliciting the information and then its subsequent analysis.

### **3.1.8 Stage eight: Gap Analysis:**

A gap analysis looks at where the organization is now and where it needs to be.

It is carried out by the project team and fits in at the end of the information gathering steps of the planning stage.

Once the gap analysis has been completed and the specific impacts have been identified it is then time to start formulating the TQM implementation plan. This is where project management tools and techniques will come fully into play, and when used effectively will help to ensure that the changes are completed both on time and within budget. As with any project, key success factors will include assignment of adequate trained resource, clear definition, and allocation of authority and responsibility and setting and monitoring of realistic time scales.

detail the potential barriers to the success of total quality management. He uses these diagrams sequentially to demonstrate the obstacles likely to occur at two stages, implementing total quality management and maintaining total quality management.

These two stages are given as Scenario A and Scenario B in Diagrams 2.6 and 2.7

## **Theme two**

### **3.2 Quality management system (Q.M.S) (ISO 9000) and Total Quality Management (T.Q.M) for Business Excellence:**

There has been a major emphasis for manufacturing firms to seek certification to the International Quality Standards ISO 9000. These have been rapidly accepted as a standard for documenting processes and procedures. ISO 9000 is a process that typically shifts an organization's culture to allow successful Total Quality Management (T.Q.M) implementation. The companies that implement ISO 9000 and T.Q.M at the same time and in an integrated manner might expect to have advantages in product quality, delivery, productivity, and customer satisfaction. ISO 9000 certification is only the beginning of a continuous improvement process rather than the end and could be a useful stepping-stone for T.Q.M. ISO 9000 can be an excellent start to T.QM, if it is interpreted in a way that encourages the company to start on the process of continual improvement by teamwork of all people working in the company<sup>1</sup>.

International organization for standardization (ISO), a global federation of 130 national standards bodies, seeks to promote standardization and the development of related activities worldwide in order to facilitate the international exchange of goods and services, and cooperation in the sphere of intellectual, scientific, technological, and economic activities. The ISO 9000 standard series is now widely accepted as a minimum standard for a quality system for companies.

The consequent application of ISO 9000 system can have a significant cost reduction effect which results in performance improvement.

**ISO 9000 provides certain benefits for organizations that can be divided into internal and external benefits:**

1. **Internal benefits are:** related to the internal functioning of the organizations. These are, for example, increase in productivity, improvement in efficiency, reduction in cost and waste, better management control,



clearly-defined organizational task structure and responsibilities, support in quality management and increase in personnel motivation.

2. **External benefits are:** benefits for the organization in relation to its environment. Examples of external benefits are; competitive advantage, increase in sales and market share, possibility of entering new markets, keeping customer relations, finding new customers, increased customer satisfaction, and increase in company reliability and reputation.

Implementing ISO 9000 alone did not contribute much to quality improvement, while a combination of ISO 9000 and TQM contributed the most.

ISO 9000 represents a trend in quality management, which cannot be ignored in today's business environment. In fact, those companies wishing to remain competitive and improve their quality systems are recommended the use of ISO 9000 as a foundation for a much broader system of TQM. This is based on the fact that ISO 9000 is an important part of TQM, and the implementation of both approaches together will lead to organizational success and competitive advantage. It is clear that both approaches tend to complement each other, ISO 9000 can be implemented first to create stability and consistency in the organization's work, then the implementation of TQM can enhance employee motivation and operational efficiency, and achieve overall organizational success and performance.

Companies applying TQM together with the ISO 9000 standards did not share positive results.

This fact leads to the consideration that, despite the beliefs about ISO 9000 as a good first step in the way of implementing TQM, once implemented, some of the ISO 9000 principles are contradictory with TQM philosophy.

When ISO 9000 and TQM are applied simultaneously, the resultant benefits to the company are not better than those experienced if either system were applied in isolation.

The emphasis on quality has led organizations to adopt TQM. Moreover, organizations and customers have demanded external recognition of quality, which has in turn provided the momentum for the International Organization for Standardization (ISO) development of the ISO 9000 series. ISO 9000 represents a trend in quality management, which cannot be ignored in today's business environment. In fact, those companies wishing to remain competitive and improve their quality systems are recommended the use of ISO 9000 as a foundation for a much broader system of TQM. This is based on the fact that ISO 9000 is an important part of TQM, and the implementation of both approaches together will lead to organizational success and competitive advantage. It is clear that both approaches tend to complement each other. ISO 9000 can be implemented first to create stability and consistency in the organization's work, then the implementation of TQM can enhance employee motivation and operational efficiency, and achieve overall organizational success and performance. On the other hand, it appears that some managers have misunderstood the role of ISO 9000 certification.

### **3.2.1 ISO 9000 family:**

In 1979, British Standards Institute (BSI) developed and published the BS 5750 series parts 1, 2 and 3. These standards based on military standards series 054<sup>4</sup>.

Series 054 were imposed by the British Ministry of Defense to the military industry during World War two (II) into the effort to increase the quality of armament.

Based on the BS5750, the International Organization for Standardization (ISO) published in 1987 the ISO 9000 series of standards.

ISO 9000 family of standards was revised in 1994, 2000 and 2008<sup>5</sup>.

ISO 9000 is a family of standards on quality management systems aimed at supporting quality efforts of organizations, regardless of sector and size.

ISO 9000 generally indicates a whole family of international standards that are published and revised by ISO/TC 176,<sup>6</sup> whose institutional scope is quality management and quality assurance. ISO 9000 family is developed by an open and transparent process and the standards represent the consensus of international quality specialists. Aiming at facilitating mutual understanding in national and international trade, ISO/TC 176 publishes a coherent set of different standards covering the quality management system (QMS).

In this contest, quality is defined as the characteristics of products and service expected by customers<sup>7</sup>. Therefore, quality management system can be defined as the management of the organization working to achieve the characteristics of the products and services expected by customers.

It is important to point out that the scope of ISO 9000 family is to provide guidance for the management of the organization but not to establish specific requirements for

the products or services that the organization produces the only standard that is intended for third part certification use, even if the whole ISO 9000 family is related to QMS.

The standards cover several aspects of quality management as shown in (Table1). In this respect, it is possible to consider the content of ISO 9000 as the formalization and rationalization of TQM principles.

### **3.3 Organizational benefits:**

The Total Quality Management (T.Q.M) as codified and embedded into the ISO 9000 standard is related to firm performance. Indeed, T.Q.M is the theoretical background of ISO 9000 family. T.Q.M is a system of management concepts and approaches that aim to improve the quality of products and services to satisfy customers' needs. The scope of both T.Q.M and ISO 9000 standards family is to provide guidance for the management system of the organizations to improve quality of products but not to establish specific

quality requirements for products or service. However, quality management philosophy theorizes that “well managed” production process will drive high quality products (Deming 1984). According to Ishikawa (1985), quality is defined as “the effort of the entire company to design, develop, produce, inspect, sell, and deliver products that meet customers at the time of purchase and long after the purchase.” T.Q.M and ISO 9000 share the idea that better management and planning of production processes can improve quality of products, reduce defects and increase customers’ satisfaction. In other words, T.Q.M and ISO 9000 aim to optimize and continually improve the whole production process and then product quality.

It is important to point out that the first versions of ISO 9000 were considered not perfectly linked to T.Q.M principles, because ISO 9000 was perceived as unnecessarily formal and excessively attentive to details of procedures at expense of flexibility.

However, during the last years, ISO 9000 evolved and improved since its first publication in 1987 addressing many of the criticisms.

The updated version of ISO 9000:2000 and the most recent ISO 9000:2008 are more strictly aligned with T.Q.M principles.

Several authors contributed to shape T.Q.M and then influenced the ISO 9000 standards family. Particularly relevant is the work of Deming (1986). After the Second World War, Deming had given several lectures in Japan about quality issues and continuous improvement.

He promoted the Plan-Do-Check-Act (P.D.C.A) methodology that is the basis of any TQM model<sup>8</sup>. P.D.C.A stresses the importance of the continuous improvement of processes to achieve and push the quality of products and services in a never-ending improvement process. Japanese authors associate continuous improvement with the Japanese word “Kaizen”<sup>9</sup>, the effort of every member of organization to progress step by step in the quality issues. “Kaizen” is usually connected with the term “Kayro” that is the breakthrough improvement. “Kayro”

requires high investment and the results are not constant, while Kaizen can provide small but constant quality improvements. TQM can be distinguished between “soft” and “hard” components<sup>10</sup>. “Soft components” are; measures that seek to gain the involvement of managers and employees in the quality management<sup>10</sup>. “Hard component” are practices related to tools of process control and compliance to procedures. Continual improvement and involvement of the management (i.e. “soft” element) are essential elements of quality management (Deming 1986).

Other authors propose marginally different suggestions, but continual improvement, committed management, and engagement of employees are common suggestion in the literature. It is important to point out that satisfaction of customer is the ultimate goal of all organization as emphasized by Juran among other authors. Focusing on customer satisfaction requires identifying customers and its needs to meet the expectations of costumers. A costumer that is satisfied is more likely to repeat the purchase. However, precise identification of customers’ expectation can be difficult.<sup>8</sup> The PDCA circle is based on the “Shewhart circle Plane, Study, Check and Act”.<sup>9</sup> “Kaizen” Japanese’ word means continuous improvement plus innovation.<sup>11</sup>

The hard components include the tools of TQM and are part of the statistical background of quality experts. Some basic tools of TQM (Juran, Defeo & Feo 2010) are listed below and are considered the core of the “hard components” of TQM\*:\*Histograms - a graph displaying data with rectangles. Stem-and-leaf plot a graph presenting frequency distribution retaining original data. Pareto analysis - a line and bar graph displaying relationship between effect and cause aiming to identify the main causes of defects Scatter plot - a graph which plots points to present relationship between. Two variables Statistical process control/ Control Charts – tool to monitor that a process is producing output.

Conforming to a determined target and tolerance cause-and-effect diagrams - Fishbone-structured diagram to facilitate identification of cause/effect patterns.

More refined and sophisticated statistical tools are available but an exhaustive description of these tools is outside the scope of the current paragraph.

Losing customers for low quality of products and service is one of the elements of the cost of poor quality. The cost of acquiring new costumers is usually higher than the cost of retaining old costumers.

### **3.4 ISO 9000 principles of Quality Management System:**

Quality Management System (QMS) standards based on some principles that meant to promote organization performance. These basic principles are eight and are presented and described in Table 2. The principles are general and need to be adapted by the organization, and they are generally considered valuable for managing effectively the organization. Some authors considered first versions of ISO 9000 too procedural and not flexible, but recent versions of ISO 9000 standards (year 2000 and 2008) are more strictly linked with TQM and some potential rigidities of previous version ISO 9000 should be solved or at least greatly reduced.

#### **Table (2) Principles of quality management system:**

Special attention is dedicated to process approach. Process is defined as any activity that uses resource as input to produce output. The process approach is the systematic identification and control of all related processes aiming at achieving the goals and at managing resources efficiently.

The process approach is based on the Plan-Do-Check-Act (PDCA) methodology that is meant as a tool for raising efficiency, effectiveness of business operations and increase customers' satisfaction.

The methodology is applicable to all processes and can be summarized in the following recursive points.

**Plan:** Establish the objectives and processes necessary to deliver results in accordance with customer, statutory and regulatory requirements and the organization's policies.

**Do:** Implement the processes.

**Check:** Monitor and measure processes and product against policies, objectives and requirements and report the results.

**Act:** Take actions to continually improve process performance.

### **3.5 TQM and Classical Management**

Taylor's scientific management survives today in TQM as re-engineering and particularly in the understanding of variance. Taylor pioneered the practice of inspecting the first pieces of each lot and performing inspections at the subassembly level. Shewhart and Deming developed this later in their analysis of variation. Elements of scientific management can also be found in any fool proofing.

### **3.6 Aspects of TQM programme**

Mayo's human resource work finds echoes in TQM in areas of empowerment, enabling, and self-managed teams and in respect for the individual.

Weber's work on bureaucracy has changed somewhat today since bureaucracy has almost become a term of abuse, standing for red tape and inflexible management. Today TQM organizations have become much more flexible, retaining mainly core activities. However, Weber's roles of job holders do find a place in ISO 9000 requirements for responsibility and authority to be defined.

Drucker's work continues to find its place today in TQM. This is in areas of education and the 'knowledge worker' and in the empowering of the worker. He

also showed that firms had responsibility not just to their shareholders but also to society. He also placed emphasis on the importance of the customer.

### **3.7 Total Quality Management excellence Models**

The various models presented by experts are most advantageous for organisations when they select which models will fit with their implementation process. It is therefore very interesting to look at important T.Q.M models from an integration point of view.

The choice of a quality model or quality system is a critical issue because it depends on the vision of the organisation. There are many models, and each model can provide an idea to any organisation, but there is no model that can furnish all the solutions for all organisational requirements. Therefore, quality models or quality systems provide a concrete foundation to communicate as to how an organisation should work and identify the responsibilities of all members participating in the organisation.

#### **The New Model for total quality management (T.Q.M):**

The new T.Q.M model provides the basis of excellence in the industry and covers all angles and aspects of an organisation and its operations. It is based on the excellent work done during the last century. Oakland presents a new model for T.Q.M that addresses the hard and soft issues of quality.

Performance improved through better planning, and the management of people and the processes in which they work. These are the keys to delivering quality products and services to customers. These four Ps; Planning, Processes, People and Performance are important in to delivering quality products and service to customers. The early frameworks of T.Q.M involved three Cs are; culture, communication and commitment, which we can never underestimate, as they are the foundation of the T.Q.M framework. Oakland adds these are as the "soft foundations" which must encase the hard necessities of planning, people, performance, and processes.



Culture played a large role in the environment of those organisations that were successful in implementing the T.Q.M approach. Communication is always seen to be essential in achieving success but the most important element is commitment, from everyone in the organisation, especially from those who are in direct interaction with customers. The customer / supplier or 'quality chains' form the core, which is surrounded by the hard management necessities of a good quality system, tools, and teamwork. This model was found to be very useful, especially from the public sector as a first step to the T.Q.M approach. **Diagram (2.10)**

## **Chapter Four**

### **Case Study**

#### **Theme one:**

#### **4. Sudan Airways Catering Building and Production:**

##### **4.1 Introduction:**

**The sudan airways company** is the national airline of Sudan, headquartered in Khartoum. The carrier, one of the oldest African ones, was formed in February 1946 and started scheduled operations in July the following year. In 1959, Sudan Airways became a member of the International Air Transport Association (IATA), the Arab Air Transport Association (AATA) and the African Aviation Companies Association (AFROA). Started its flights in July 1947 with a fleet of four planes.

The Rehabilitation and modernization programme was not confined to the fleet. Plans were set in order to include all the Company. The major part of this programme centering on manpower investment, was achieved; this include training engineers, technicians, pilots and the introduction of the computers methods. All employees in the Company were trained on the computer. There are also ambitious plans to develop services in the field of air hosting, supply cleanliness, reading, music and video to cope with contemporary huge developments.

##### **4.2 The catering building Description (General Overview of Sudan Airways Catering Section).**

###### **1.2.1 The catering position (Diagram 2.8):**

It lies near the \*Tarmak (The road area at which the aircraft can take off, make a taxation, positioning and landing) & facing (The Hanger) an Aircraft maintenance area.

#### **4.2.2 The catering building' components**

Small, Old building composed of the following:

##### **a. The Reception:**

Where the security guard look after the catering building and it is content, such as Employees, Labors, All items in stores, Ready meals and sealed the trolley (contain the ready meals) at the presence of food quality controller.

##### **b. Stores, which include the following**

###### **1: Stores inside the catering**

- a) Cold Rooms (There are three); it is fed directly from the cold store it contain all items, such as, mineral water, soft drink, sometimes fruits and tomato paste cane ..... Ect.
- b) Main Dry Store, which contains the following:
- c) Sugar, Salt, Flour and many anther things ..... ect
- d) Cold Store, which contains the following:
- e) Soft drinks, Mineral water, Lavchectti, Different juices and Portion jam....etc .
- f) Sub-Store, which contains the following:
  - 1. The same items in the main store, but in small quantity according to production needs.
  - 2. It is fed directly from the main store.
  - 3. Hot Kitchen store:

Contain the Spices, Onion .....ect.

##### **The Stores Drawback:**

- 1. There is not sufficient lighting, Racks (Which, carries the food material) it is old.
- 2. There is not sufficient space between racks. Sometimes put the food items on a wooden stand (directly on the floor); also, there is no space between them.

3. Insufficient thermometers (to measure the temperature and humidity) in some stores.
4. Insufficient stores to keep every item according to the adequate storage conditions.
5. No implementation of the concepts of FIFO (First in First out) meaning the first food item received used before the latest one.
6. There are holes in walls of some stores lead to enter the rats and insects.
7. Stores are not designed according to the standard specifications.

#### **1. Stores outside the catering:**

There are two stores outside the building used for non-food items such as; Cutlery, Foils and disposable items. In addition to, above stated drawback, the position of these stores outside the catering increasing the risk of bad handling of these non-food items.

#### **4.2.3 The production halls there are five halls, which include:**

1. Hot kitchen, (composed of Butcher room, washbasin equipment, Food preparation hall and packing hall),
2. Cold kitchen.
3. Bakery hall.
4. Dessert hall.
5. Equipment washing hall.

#### **The Halls drawback:**

The internal environment is not appropriate, for example:

1. There is no suitable and special cooling system for food preparation and packing; the existing one include insufficient and unsuitable one (normal cooling).
2. In some hall, there are fans and this is against the regulation of food preparation and packaging.

3. Most of the work manually there is no automatic system to reduce the risk of manually system.
4. In the autumn season water flows into the halls.
5. There is no thermometer to measure the temperature and humidity.
6. Insufficient insect killer.
7. The food preparation tables old and not designed according to standard.

#### **4.3 The managers' drawback:**

1. Lack of information & background concerned about Food Quality Control & Assurance.
2. There is no clear commitment to implement total Quality Management (T.Q.M) & Continual Improvement (C.I) initiatives.
3. There is no clear plan & strategy to implement Total Quality Management (T.Q.M) & continual improvement process.
4. Lack of provision of resources such as:
  - a) Financial resources.
  - b) Well trained & qualified worker.
  - c) Equipments, Devices and instrument;
  - d) All type of equipments is an old and insufficient.
  - e) The laboratory devices and instrument are insufficient and not calibrated.
  - f) Supplier relationship management, they providing food raw-material.

#### **4.4 The supplier drawback:**

1. The food transportation means are not according to standard; most of supplier brings the food items in Amjad and Box (type of the cars) and not in the chillers.
2. They did not have any food standard specifications these from

Sudanese Standardization and Metrological Organization (S.S.M.O) a formal organization determine the food standard specification to be suitable for human being usage.

3. The accumulation of supplier's debt.

#### **4.5 Customer and Passenger drawback:**

- I. Customer and Passenger communication means problems to know his needs, wants, and beyond his expectations;
- II. There is no documented evidence about how they communicate with their customer to know their needs, wants and beyond his expectations.
- III. Present to Passenger frequency meals (No innovation & Creation).

#### **4.6 The catering building drawback, such as;**

1. Position, as it cited above it is unsuitable for food preparation.
2. Unsuitable inertial design (Lighting insufficient and the present one Does not work well, Ventilation (It is not good in production area), Garbage inside the building, storage, bathrooms, Receiving room & break workers).

#### **4.7 Employee's drawback, such as;**

Education, Training, Satisfaction, Uniforms & Turnover...est.

1. Most of the employee did not have any education.
2. Most of them did not obtain any training in job field.
3. They did not satisfy, because of the current company situation.
4. They have old uniform.

#### **4.8 General drawback**

1. Inadequate attention to different Critical Success Factors (C.S.Fs) and Quality Management System (Q.M.S) practices, so as to implement Total Quality Management (T.Q.M) in Sudan Airways Catering section.
2. Failure to develop an implementation framework that fits to a specific service & production organization; instead of more generic model or a copy of a system that was successful for another organization was used.
3. Lack of top and middle management commitment, unrealistic expectation and.
4. Confusion, cross-functional teams are not employed, and lack of direction and purpose.
5. No targets and attitude to attain continuous improvement culture, resistance to change and best practices of other companies are not benchmarked.

#### **Theme two:**

#### **4.9 Service Quality Measurement:**

In order to achieve rationality the models of business excellence also, in a way, determine whether the criteria have been met, but the evaluation of business excellence is based not only on the fulfillment of the set criteria but also on the determination of the level up to which the criteria have been fulfilled (systems of points).

When analyzing the quality of service it is desirable to analyze the largest possible number of companies supplying the same type of service. As we already mentioned, if a company carries out a research and finds that the results are negative, it can interpret this information in the wrong way and conclude that it provides services in a very wrong way. On the other hand, when analyzing a large number of companies, it is possible to compare data and obtain a realistic picture of the position of an individual company compared to others regarding quality.

The expected service is the function of earlier experiences of the customer

(Passenger), their personal needs, and oral communication. Communication with the market also influences the expected service. Experienced service, here called perceived service, is the result of a series of internal decisions and activities. The management's perception of the customer's expectations is the guiding principle when deciding on the specifications of the quality of service that the company presented.

If there are differences or discrepancies in the expectations or perceptions between people involved in providing and consuming services, a “service quality gap” can occur. Since there is a direct connection between the quality of service and the satisfaction of customer (Passengers) in catering industry, it is important for the company to spot a gap in the quality of service.

### **1. The first possible gap :**

The knowledge gap; It is the result of the differences in managing knowledge and their real expectations.

This gap can lead to other gaps in the process of service quality and is, among other things, caused by:

- a) Incorrect information in market researches and demand analysis.
- b) Incorrect interpretations of information regarding expectations.
- c) Lack of information about any feedback between the company and the customers directed to the management.
- d) Too many organizational layers that hinder or modify parts of information in their upward movement from those involved in contact with the customers.

### **2. The second possible gap:**

The standard gap; it is the result of differences in managing knowledge of the customer's expectations and the process of service provision (delivery).



**This gap is the result of:**

1. Mistakes in planning or insufficient planning procedures.
2. Bad management planning.
3. Lack of clearly set goals in the organization; and.
4. Insufficient support of the top management service quality planning.

The management can be right in evaluating the customer's expectations and develop business methods to satisfy these expectations, without the employees being correct in providing service. For example, a restaurant can order the waiters to serve the customers in two minutes after they sit at the table. Nevertheless, the cabin crew can ignore that specification and talk between them on the side.

**3. The third possible gap :**

Is the communication gap arising when there is a difference between the delivered service and the service that the company promised to the customers via external communications. The reasons are:

1. The planning of communication with the market is not integrated with the services.
2. Lack or insufficient coordination between traditional marketing and internal system procedures.

### **Theme three:**

## **5 Design of Catering and Facilities:**

### **5.1 Introduction:**

Catering for large numbers in Service messes requires specialist knowledge to ensure that facilities are designed and equipped to meet the present and foreseeable demand.

### **5.2 Kitchen Design for Food Safety and quality:**

Had have a profound effect on the standard to which current and future catering facilities must conform.

Early consultation with all disciplines and interested parties is recommended to ensure that every aspect of the design is covered.

Failure to seek specialist advice can result in non-compliance with legislation, nugatory expenditure on inadequate or unnecessary equipment and increased operating costs due to over-large facilities or poor equipment layout.

The above Act clearly sets out in some detail, the general requirement for food premises.

These may be termed as the performance specification for the planning of food premises. To set these in architectural and building terms, the design and construction of all food premises should:

- I. Allow for the building to be kept clean and maintained in good condition and.
- II. repair.
- III. Enable adequate cleaning and/or disinfecting.
- IV. Provide prevention against the accumulation of dirt, contact with toxic.
- V. Provide protection of cross contamination between and during operations – by materials or the shedding of particles into food.
- VI. Inhibit the formations of condensation or mould.

VII. Facilitate good hygiene practices.

VIII. Provide appropriate temperature conditions for the processing and storage of.

IX. products. foodstuffs, equipment, materials, water, air supply, personnel or by external sources, including Pests.

These general requirements are followed by more focused requirements, some specific to selected aspects of a building including washbasins, lavatories, sanitary conveniences, changing facilities, ventilation, air flow, lighting and drainage.

The Act then lists the requirements for the interior of a building with regard to floor and wall surfaces, wall construction, ceilings and overhead fixtures, windows, doors, surfaces in contact with food, facilities for cleaning and disinfecting tools, equipments, and provision for the washing of food.

These requirements, which apply to permanent buildings, also apply to mobile or temporary facilities.

### **5.3 Cross Contamination:**

The core planning criteria centers on designing of facilities to avoid cross contamination of foodstuffs.

The separation of raw and cooked foods is essential in meeting these criteria and can be achieved by:

1. The physical separation of raw and cooked meat products.
2. The use of separate workbenches.
3. The use of separate refrigerators.
4. The use of separate staff.

## **5.4 Hazard Control:**

In practical terms, the planning and operation of kitchen and dining facilities is based to a large extent upon **Hazard Analysis & Critical Control Points (HACCP)** processes.

Modern catering and distribution techniques have increased the number of stages in the food production chain, and therefore the number of opportunities for bacteria and contamination to enter the food chain. There is therefore an increased necessity for hazard identification, control, and the increased awareness of working conditions.

HACCP identifies four main hazards that may arise within catering premises, all of them relate to contamination:

- 1.By **bacteria** or other **micro-organisms** that cause **food poisoning**.
- 2.By **chemicals** such as cleaning materials or pest baits.
- 3.By **foreign materials** such as glass, metal or plastic.
- 4.By **water**.

Architecturally, efficient planning and design and the selection of types of construction and materials can control hazards.

## **5.5 Planning And Design**

The planning of a catering facility and its detailed design is the fundamental basis of the control of the hazards within which good management and working practice take place. In addition to providing for the function of the building and the activities within it, the layout and design of the buildings should allow access for effective cleaning. All hazards are important but the most pressing is contamination. This should be controlled within the layout, planning of the building including external, internal, and circulation routes.

## **5.6 Control of cross Contamination**

Planning separate entries and exits to and from the building to reduce cross contamination by separation. This includes cross contamination at the point of delivery of stores and fresh foods, exit of rubbish and swill and the movement of people in and out of the building.

Planning for a minimum of entries and exits to and from the building so that the management of movement in and out of the building can control cross contamination.

The design and layout of individual spaces, include internal circulation and movement within spaces and rooms, such that there are clean and non-clean areas.

Minimizing the movement through and between rooms (e.g. dirty vegetables do not enter the vegetables Preparation area through the kitchen; they enter the vegetables Preparation through a door at the delivery end of the room and only the clean, prepared vegetables enter the kitchen through a separate door). The vegetables Preparation generates a lot of waste, which is taken directly outside (or macerated) and generates a lot of waste, which is taken directly outside (or macerated) and does not contaminate the clean vegetables, the raw vegetables or the kitchen.

## **5.7 Separation of functions between spaces**

Clean functions should be kept separate from dirty functions - (e.g. a corridor separates the refuse area and swill area from the kitchen area). Visitors in “street” clothes have the opportunity to change into clean protective clothing upon entry to the building or to meet with staff in the “dirty” office.

Provision for separation of activities within spaces including preparation areas, hot and cold (Larder), cooking areas, cold holding (refrigerated storage) and hot holding (Servsery).

Management and monitoring of these separate spaces can be facilitated by the provision of dwarf walls between the activities.

Provision for sufficient spaces within rooms. The layout of spaces should be such that high-risk foods can be prepared on separate work surfaces and equipment.

Storage of edible foodstuffs being kept separate from toxic cleaning materials and swill; fish is kept separate from meat; dairy products are kept separate from vegetables etc. There should be marked shelves, locked cupboards and organised shelving.

Menu choice has an effect on the use of the kitchen especially of storage and preparation fresh or frozen produce or both. This requires that sufficient chilling and frozen storage equipment be provided for flexibility.

Keeping foods separate within workspaces (e.g. dry goods, seasonings, daily ingredients, liquids in chilled drawers, etc). Provision should be made for the holding and handling of foods at appropriate controlled temperatures.

The design of functional relationships between rooms, ease of direct and indirect access between rooms to provide efficient flows of operation.

## **5.8 Construction and Material – key considerations**

1. The internal surfaces of the structure and equipment fixed to the structure, including light fittings, ventilation and any other equipment must be visually clean and in a good state of repair.”
2. Food premises must be maintained to a standard that will allow effective cleaning.”The appropriate use of construction and materials must allow both of these concerns to be met and to allow for the type of cleaning appropriate to each area. The spread of bacteria and the containment of contamination can be controlled by materials and construction.
3. Construction materials should not include any substance that may add toxic materials to food either by direct contact or by vapor. Finishes should be such that they do not lead to shedding of particles.
4. Construction materials should not include any substance that may add toxic materials to food either by direct contact or by vapor. Finishes should be

such that they do not lead to shedding of particles.

5. Construction materials should not include any substance that may add toxic materials to food either by direct contact or by vapour. Finishes should be such that they do not lead to shedding of particles.
6. There should be positive airflow between critical areas including the provision of air at the correct temperatures, e.g. cool air in the larder and the avoidance of any build up of condensation.
7. Appropriate insulating materials should be used in order to control temperatures within refrigerated cold rooms. Internal walls should be of solid construction to prevent the harborage of pests.
8. Other considerations such as work patterns, movement of equipment or control of activities will override this consideration (e.g. the use of dwarf or screen walls between the Kitchen and the Larder and the Pastry Preparation). In these spaces the ambient temperature at the work surfaces can be controlled by the flow of the cooled air.
9. Other considerations such as work patterns, movement of equipment or control of activities will override this consideration (e.g. the use of dwarf or screen walls between the Kitchen and the Larder and the Pastry Preparation). In these spaces the ambient temperature at the work surfaces can be controlled by the flow of the cooled air.
10. Floors should be laid to allow for the desired flow of water during cleaning and be finished with the appropriate non-slip, easy to clean and maintain covering material such as ceramic floor tiles.
11. Integrated ceilings should be provided which contain integral lighting and ventilation systems in a sealed unit with a hygienic surface that is easily cleaned and maintained.
12. The provision of adequate and appropriate working conditions with regard to temperature, air purity and lighting must be considered.

## **5.9 Catering Areas - Key Considerations:**

### **5.9.1 Application:**

The catering area (food rooms or food areas) is defined as all those areas within the catering facility where food is delivered, stored, prepared, cooked and served, including all connecting corridors where food is likely to be transported. Also included those areas designated for washing facilities and general equipment storage.

Drinks, of all kinds are also defined as 'food' and those areas where drinks are stored and served are also to be treated as food areas.

A principal objective of kitchen planning is ergonomic efficiency, making optimum use of workers' activity within the environment. A way of achieving this is to make transit routes between the different production areas or work centres of the catering operation as efficient as possible.

Wherever possible, the kitchen and its ancillary areas are to be located on the ground floor of a building with direct level access for deliveries and the removal of waste. Where it is proposed to site a kitchen above (or below) ground level, a great deal of thought is required to ensure that goods in and waste routes can be efficiently managed. The choice of utilities may also be limited. It is preferable that this entrance is at the opposite end of the building to the external kitchen service areas.

### **5.9.2 Spatial Standards:**

It is important to provide safe working and circulation space for the staff. Spatial standards are dictated by the catering activity and the proximity of the activities in relation to each other to provide a safe working and circulation space.

A minimum of 1200mm should be allowed between a wall or doorway and any item of cooking equipment, the service side of a servery counter or a worktop. A minimum of 1800mm should be allowed between any adjacent items of cooking equipment, the service side of a servery counter or a worktop. Where the working



sides of cooking equipment are adjacent to each other and the working process is considered to be dangerous, this distance should be increased to 2000mm. e.g. deep fat frying and grilling.

### **5.9.3 Workflow Patterns:**

Food rooms and the equipment within them should be sited to provide the necessary direct flow and functional relationships. A linear workflow is required, as it is a means of maximizing process hygiene and ergonomic efficiency. This means that the workflow from the goods inwards area to storage, preparation, the cooking process and service to washing up pass in a direct line. Equally the route of wastage should be directed to avoid the event of any cross contamination with 'clean' foods. Where possible, a separate entrance should be provided for the staff and be designed to avoid the need for front of house staff having to access the kitchen areas to reach their place of work.

### **5.9.4 Kitchen:**

#### **Function:**

The kitchen is the main hub of the facility. Its prime function is cooking and finishing of food prepared elsewhere within the facility and from where it is moved forward to the service area.

#### **Layout Considerations:**

Equipment should be laid out to make best use of the space available and provide a workflow from the preparation areas through to the servery.

Kitchens should be planned with separation between the kitchen and the servery area but this can also be influenced by the style of service.

Kitchens require a direct functional relationship with storage and preparation areas, servery and the utensil wash.

The prime cooking equipment should be located, wherever possible, in an island setting. Similar types of equipment to be grouped together with sufficient

worktop space placed adjacent to allow 'put-down' space.

Heavy processes such as frying etc, should be grouped together. In larger kitchen the equipment (deep fat fryers, bratt pans, etc) may be sited in a separate suite, preferably in a central cooking suite rather than against a wall.

Equipment providing long cooking processes such as ovens etc, need to be located furthest from the servery access whereas short order grills and ranges should be located nearby.

All equipment should, where practicable, be mobile to facilitate cleaning and maintenance.

Adequate space should be allowed to provide access for cleaning and to avoid damage to fabric and fittings. Sufficient equipment should be available to enable all of the kitchen operational tasks to be carried out in a safe and hygienic manner. Adequate floor drainage gullies should be installed to allow direct discharge from defined items of catering equipment and allow appropriate drainage to assist floor Cleaning procedures.

### **5.9.5 Utensil Wash:**

#### **Function:**

All cooking equipment from the kitchens area and the servery is washed at this location. This includes pots, pans, gastronorm service containers, utensils and parts from food preparation equipment. Waste food is either scraped into suitable containers prior to further treatment or disposed of in the waste disposal unit.

Washed utensils, etc, are rinsed in hot water ( $>82^{\circ}\text{C}$ ) and left to drain dry prior to being stored on the storage racks.

The utensil wash has a direct functional relationship with the kitchen and the server area.

The equipment layout should allow adequate space to receive the dirty utensils and provide a linear flow.

The provision of a pass-through Utensil Washing machine should be considered. The KDEA should be consulted at an early stage.

Adequate dedicated ventilation and extraction shall be provided to ensure that steam emitted from the utensil washing machine or sterilizer sink does not give rise to condensation within the room.

Adequate floor drainage gullies should be installed to allow direct discharge from defined items of catering equipment and allow appropriate drainage to assist floor cleaning procedures.

Systems shall be designed to ensure that adequate space is available to receive soiled utensils, scraping and sorting of containers and pans prior to washing and that the draining bench is of sufficient size to allow adequate air drying prior to stacking. Sufficient storage space is to be provided for clean items.

#### **5.9.6 Pastry Preparation:**

##### **Function:**

The pastry preparation area produces the cakes, pastries, hot and cold sweets, etc to meet the daily menu requirements, including raw pastry for use by the kitchen. This room will be provided where it can be demonstrated that there is sufficient output to justify it.

##### **Layout Considerations:**

There should be direct access from the pastry area to the kitchen and it has a direct functional relationship with the dry goods store and service area. Bulk food items such as sugar and flour are usually issued from the store in large single units. The provision of mobile bins is therefore required for storage under workbenches. Shelving may be provided for the storage of partial packaged food products that have been decanted into air-tight containers.

Sufficient equipment should be provided to allow all of the operational tasks to be carried out in a safe and hygienic manner. Food items prepared ready for cooking or for service will need to be stored in the correct temperature regime

prior to being required.

A dedicated extraction system incorporating grease filtration is required for the removal of heat, odors and fumes from any prime cooking equipment.

Adequate floor drainage gullies should be installed to allow direct discharge from defined items of catering equipment and allow appropriate drainage to assist floor-cleaning procedures.

The location of the scaled boiling top and combination oven may be in the main kitchen adjacent to the pastry area thus removing the requirement for grease filters and additional ventilation/extraction; that said, adequate ventilation is required within the room.

#### **5.9.7 Larder:**

##### **Function:**

The larder is the main food preparation area and should be considered as the area offering the highest risk in terms of food preparation and cross contamination. Where space is at a premium the raw meat preparation area may be included within the larder, however, strict separation of the work processes should be demonstrated.

##### **Layout Consideration:**

The larder has a direct functional relationship with the main kitchen, servery, storage and delivery areas.

Sufficient equipment should be provided to allow all of the larder operational tasks to be carried out in a safe and hygienic manner.

Food items prepared ready for cooking or service will need to be stored at the correct temperature regime until required.

The room shall be self-contained and only designed as part of the Raw Meat Preparation to utilize a single air cooling facility where space is severely restricted. In all new build projects and the majority of refurbishments, the larder

and raw meat preparation areas shall be separate rooms. Where a combined room is the only option, the layout shall ensure the physical separation of areas for raw and cooked foods at all times with any dwarf wall separation being a minimum of 1800 mm above finished Floor Level (AFFL). Sufficient wash hand basins are to be provided and sited to ensure that there is no risk of cross contamination.

The area shall be provided with a dedicated wash hand basin. When high-risk operations are taking place, the temperature in the room is to be capable of being maintained at +13°C. Adequate floor drainage gullies should be installed to allow appropriate drainage to assist floor cleaning procedures.

#### **5.9.8 Raw Meat Preparation:**

##### **Function:**

The Raw Meat Preparation provides storage and preparation facilities for meat, poultry, fish etc... following delivery and prior to cooking.

##### **Layout Considerations:**

The raw meat preparation has a direct functional relationship with the main kitchen, storage and delivery areas. It should be sited close to the loading/unloading area to reduce the risk of cross contamination. Sufficient equipment should be provided to allow all of the operational tasks to be carried out in a safe and hygienic manner. Adequate holding facilities will be required to keep prepared food in the correct temperature regime until required.

The room shall be self-contained and only designed as part of the Larder Preparation to utilize a single air cooling facility where space is severely restricted.

The larder and raw meat preparation areas shall be separate rooms. Where a combined room is the only option, the layout shall ensure the physical separation of areas for raw and cooked foods at all times with any dwarf wall separation being a minimum of 1800 mm above finished Floor Level (AFFL). Sufficient wash hand basins are to be provided and sited so as to ensure that there is no risk

of cross contamination.

The area shall be provided with a dedicated wash hand basin. When high-risk operations are taking place, the temperature in the room is to be capable of being maintained at +13°C.

Adequate floor drainage gullies should be installed to allow appropriate drainage to assist floor-cleaning procedures.

#### **5.9.9 Vegetable Preparation and Storage:**

##### **Function:**

All fresh vegetables, salads and fruit are received, stored and prepared in this area prior to being forwarded to the suitable kitchen for further processing.

#### **5.9.10 Layout Considerations:**

The Vegetable Preparation Room has a direct functional relationship with the goods inwards area and the main kitchen.

The room is predominately a wet area and mobile sinks are regularly used for the transport of prepared vegetables to the kitchen. A suitable potable cold water tap is required for filling the sinks. An adequate floor drain is required to empty the mobile sinks and provide for effective cleaning and wash down of the room.

Equipment should be laid out to make best use of the space available and provide a linear storage and workflow from the preparation areas through to the kitchen.

Sufficient equipment should be provided to allow all of the vegetable preparation tasks to be carried out in a safe and hygienic manner; noting that food is prepared ready for cooking and will need to be stored prior to being required.

The temperature in the room is to be capable of being controlled to ensure that it is not above +16°C.

### **5.9.11 Daily Store (Kitchen Food Store):**

#### **Function:**

The kitchen food store provides storage facilities for food items required for the day- to-day running of the kitchen, pastry and larder departments.

#### **Key Layout Consideration:**

The kitchen food store shall be sited within the kitchen area and near to the grocery store. Additionally, it should be in a cool area and not adjoining a calorifier, boiler or plant room where heat transfer through the walls and piping is likely. The room should be secured and be provided with a lockable door.

Adequate ventilation shall be provided.

Consideration may be given to combining the Day Store and Bulk Grocery Store to provide one large storage area where the administration for the issue of stores allows. The relevant KDEA should be consulted.

### **5.9.12 Kitchen Equipment Store:**

#### **Function:**

This room provides storage facilities for spare kitchen equipment utensils and cooking pans that may not be in daily use.

#### **Layout Consideration:**

The store has a direct functional relationship with the main kitchen and the utensil wash.

Adequate ventilation shall be provided to prevent condensation.

### **5.9.13 Bulk Refrigeration / Freezer Store:**

#### **Function:**

The Bulk Refrigeration/Freezer Store houses the main chilled and frozen food deliveries prior to issue to the other areas.

**Layout Consideration:**

The room must be self-contained and capable of being secured.

It should be sited close to the loading/unloading area and the Catering Control Offices. Access should be wide enough to accept palletised deliveries where specified. The area shall be well ventilated and provide sufficient air changes capable of extracting heat given off from the refrigeration and freezer plant and meet the manufacturers recommendations for operating temperatures.

Consideration may be given to the provision of walk-in modular refrigerators and freezers when the menu dictates a requirement for a large quantity of lighter, bulky items.

Where tiled floors are adjacent to the installation, the floor finish should be continued into the walk in facilities. An under- floor heating system shall be provided within deep freeze installations where the tiled floor is continued into the modular section.

**5.9.14 Bulk Grocery Store:****Function:**

The Grocery Store receives and issues the full range of food commodities.

**Layout Consideration:**

The room must be self-contained and capable of being secured. It shall be sited close to the loading/unloading area and the Catering Control Offices.

Access to the store and the gangways within shall be wide enough to accept palletised deliveries.

The area must be well ventilated and provide sufficient air changes capable of extracting heat given off from any refrigeration and freezer plant and be temperature controlled within the range of 12°C – 16°C.

Insulation, contained in vapour proof bags shall be provided to the back of the ceiling tiles to prevent condensation, loose insulation is unacceptable.



Consideration may be given to combining the Bulk Grocery Store and Day Store to provide one large storage area.

#### **5.9.15 External Service Area (Delivery and Refuse):**

##### **Function:**

The external service area is the delivery point for all items of food which are to be handled by the catering department. It is also the collection point for all kitchen and dining room waste and refuse. It is essential that this area be designed to ensure that these two processes are kept separate.

##### **Environmental Issues:**

Each Unit will have an Environment Policy, which should be taken into consideration when planning the external service areas to the catering. Adequate space shall be provided to meet the Unit's policy statements and be able to support all the activities proposed within it and meet with current environmental legislation.

##### **Layout Considerations:**

The area should be sited at the rear of the catering complex. Where possible, the area should be suitably screened from public view to improve the overall appearance of the catering.

The approach road should provide good vehicular access with adequate turning space to allow effective delivery for all sizes of vehicles up to, and including, large articulated lorries.

The design of roof and ceiling heights should give consideration for the tipping and compacting of refuse and access to, and through the area for vehicular traffic.

A covered area should be provided to the goods inwards entrance to protect incoming goods from inclement weather when being unloaded.

There should be easy, level access for the unloading of goods. Ramps and

threshold strips are to be suitably graded for delivery cages, trolleys and hand operated forklift traffic and set at a gradient to meet current Health & Safety requirements. Where levels differ and direct access is not possible then the installation of an appropriate loading platform should be provided. All hard surfaces should be smooth for ease of cleaning and to allow use of trolleys and hand operated forklift units.

The designer should determine at an early stage of the catering construction, the use of hand operated forklift traffic and the extent to which they are used within the building between the delivery and storage areas. Floor finishes in these areas should be appropriately specified to accept such heavy load traffic.

To avoid the risk of cross contamination there should be adequate separation between the goods delivery and refuse collection points.

Weather protection shall be provided to the unloading area and the refuse collection point.

A cold water point and drainage gully for wash down of the area should be provided.

An external electricity supply should be provided for a high-pressure water or steam cleaning machine.

External lighting shall be provided for the unloading/loading areas and refuse collection areas.

#### **5.9.16 Wet Refuse (Food Waste):**

Where automated systems do not exist an area shall be provided for the storage of separated wet refuse. It shall be a well-ventilated enclosure, which is fly, vermin and weather proof. Wet refuse should be suitably stored or processed taking into account the Environmental Protection Act 1990.

Where specialist systems such as vacuum removal and bulk storage or accelerated decomposition systems are installed to hold waste food for long periods prior to further processing and re-cycling, such containers shall be located

in a covered weatherproof area or within a dedicated room. Bulk storage of waste food within sealed tanks shall be located within 70 metres of the disposal point and the external pump out valve shall be easily accessible to vehicular traffic.

Specific services to be provided include an appropriate external electricity supply, external lighting, a cold-water point for wash down and a floor drainage gully into the mains drainage system rather than a soak away.

#### **5.9.17 Waste Oil Storage:**

An area shall be provided for the storage of waste oil. It shall be either a well-ventilated enclosure, which is fly, vermin and weather proof or a purpose designed bunded item of equipment on a hard standing.

Waste oil shall be stored in suitable closed containers which in turn shall be stored in the bunded area or receptacle that meets with current environmental regulations.

#### **Cleaners Room:**

##### **Function:**

The Cleaners Storeroom is used for the storage of the day-to-day cleaning materials and equipment such as brooms, buckets, mops, floor cleaning machine, power washer, etc.

##### **Layout Considerations:**

Provision is to be made for the filling and emptying of buckets, the washing and rinsing of mops, etc, remote from food preparation and dining areas.

A rack is to be supplied on which to hang mops and brushes subsequent to washing.

Wall protection is required to prevent damage to the wall in the local area.

To comply with 'Control of Substances Hazardous to Health' (COSHH) provision should be made for the bulk storage of chemicals for dishwashers, cleaning materials, etc, where not provided elsewhere in the building. These

materials should be kept secure from the day-to-day requirements.

Where the Cleaners Room is remote and not adjacent to a wash hand basin, a wash hand basin shall be provided.

### **Theme three:**

#### **1. Water Supply:**

##### **1.1 Applicable Areas:**

- a) All catering areas.
- b) Staff facilities.
- c) Internal customer toilets.

##### **1.2 Planning Principles:**

An adequate supply of clean hot and /or cold potable water is required and must meet the statutory requirements of the water supply authority.

All visible supply services together with associated joint connections, supports and quick-disconnect units, shall be of chromium-plated copper or stainless steel.

##### **1.3 Water Quality & Treatment:**

Potable cold water shall be supplied directly from the mains supply pipe to all food preparation sinks, drinking water points, cooking equipment, beverage-making equipment.

All sinks and wash hand basins require a hot and cold water supply with the exception of the potato preparation sink.

An external cold water supply suitably protected from frost conditions shall be supplied to the refuse area.

Many items of equipment have exacting requirements for the constant quality of water supply to enable them to function efficiently. These include minimum/maximum pressure ranges, the degree of mineral content that could

cause scale formation and the  $p^H$  level (**The degree of acidity and alkaline substance**).

The layout and design for the provision of the water supply shall take account of the individual equipment requirements in order that manufactures' warranties are not invalidated, however, this shall not affect the requirement to provide potable cold water supplied directly from the mains supply pipe to all food preparation sinks, drinking water points, cooking equipment and beverage.

## **2. Emergency Isolation:**

Emergency isolators (panic buttons) shall be installed adjacent to the main entrances/exits and emergency exits. They shall be manually operable, suitably protected against accidental use and clearly labeled.

### **2.1 Lighting:**

The design of the lighting layout shall take account of the kitchen equipment layout and the presence of obstructions, etc, that may cast shadows across areas where high-risk activity is undertaken.

The lighting design and installation shall consider the use of energy saving systems.

The lighting shall provide a safe operational working environment. External weatherproof lighting shall be provided at entrances, loading, and refuse areas.

### **2.2 Ventilation:**

#### **Applicable Areas:**

- I. All catering areas.
- II. Storerooms.
- III. Staff facilities.
- IV. Cellars.
- V. Toilets areas.

Ventilation design is fundamental to the efficient environmental operation of a catering unit and must incorporate a number of features including; the capture of smoke, steam, fumes and odours, grease extraction and disposal, reduction of carbon monoxide levels, fire protection and the maintenance of acceptable air quality and temperature.

### **2.3 Air Cooling-Preparation & Storage Rooms**

In addition to the provision of fresh air and extraction, in the larder and raw meat preparation areas the temperature shall be controlled at +13°C during working hours.

The bulk grocery store shall be controlled at +12°C to +16°C and the vegetable preparation and storage room to a maximum of +16°C.

The cooling system shall be a ceiling mounted cassette unit of an adequate size to maintain the desired room temperature, be draught free easy to clean and incorporate a bactericidal filter. Drainage may be required to receive condensate from the equipment.

### **2.4 Refrigeration & Freezer Storage Rooms:**

Where refrigerated and frozen food storage cabinets are installed in closed rooms the area shall be well ventilated and provide sufficient air changes to extract the heat given off from the refrigeration and freezer plant and meet the manufacturer's recommendations for operating temperatures. Mechanical extraction shall be provided above refrigeration and deep freeze cabinets.

### **2.5 Waste Management:**

#### **Food Waste Management:**

Food waste management is a core issue within catering facilities; wherever food is handled, waste is produced. Food waste can create food hygiene risks whether stored in local containers, double bagged within external bins or during transportation and its handling can be a time, energy and space consuming process.

The Directive represents a step change in the way we dispose of waste through waste Minimization and increased levels of recycling and recovery. Its overall aim is “to prevent or reduce as far as possible negative effects on the environment, in particular the pollution of surface water, groundwater, soil and air, and on the global environment, including the greenhouse effect, as well as any resulting risk to human health from the land filling of waste, during the whole life-cycle of the landfill.” Certain wastes are banned from landfill by the Directive; the list is extensive, however, the major items affecting food waste are ‘liquid waste and raw meat product waste’.

#### **Theme four:**

### **6. Cost of Storage Control:**

#### **6.1 Definition of control:**

Control is a process by which a manager attempts to direct, regulate and restrain the action of people in order to achieve the desired goal (financial success).

#### **6.2 Definition of cost control:**

1. The process whereby a manager attempts to regulate costs and guard against excessive cost is known as cost control.
2. It is ongoing process and involves every step in the chain of purchasing, receiving, storing, issuing, and preparing food and beverages for sale, as well as scheduling the personnel involved.
3. Exact methods for cost control will vary from place to place, depending in part on the nature and scope of operation; but the principle behind varying methods will be constant

#### **6.3 Types of Cost:**

##### **1. Fixed Cost:**

Are those that are normally unaffected by changes in sales volume. The term fixed should never be taken to mean unchanging, merely to indicate that any

changes may occur in such costs are related only indirectly to changes in sales volume. Examples: Rent, Utilities, Insurance Premiums.

## **2. Variable Cost:**

A variable cost is one that varies on a linear basis with revenue. Are those that are clearly related to business volume. Directly variable costs are those that are directly linked to volume of business, such that every increase or decrease in volume brings a corresponding increase or decrease in cost. The obvious variable costs are food and beverage. The more foods and beverage sold the more that have to be purchased. If revenue is zero, then the cost should also be zero. As business volume increases, so do these costs. As business volume decreases, so do these costs.

## **3. Direct cost:**

Direct cost is a cost that is the responsibility of a particular department or department manager. Most direct costs will go up or down, to a greater or lesser degree, as revenue goes up and down. Because of this, they are considered controllable by, and thus the responsibility of, the department to which they are charged. Examples of this type of cost would be food, beverages, wages, operating supplies and services beverages and linen and laundry.

## **4. Indirect Cost:**

An indirect cost is commonly referred to as an undistributed cost or one that cannot easily be identified with a particular department or area, and thus cannot be charge to any specific department. For example, property operation, maintenance and energy cost could only be charged to various departments (such as linen or food and beverage) with difficulty. Even if this difficulty could be overcome, it must still be recognized that indirect costs cannot normally be made the responsibility of an operating department manager. Indirect costs are also sometimes referred to as overhead cost.



#### **6.4 The Purchasing Department:**

The purchasing department's role is to make sure that supplies, equipments and services are available to the operation in quantities appropriate to predetermined standards, at the right price and at a minimum cost to meet desired standards.

Flight catering starts with an understanding of the number of passengers and their needs; such information is available from both market research and actual passenger behavior. Based on this, airlines, sometimes in consultation with caterers and suppliers, develop their product and service specifications. Such specifications determine exactly what food, drink, and equipment items are to be carried on each route for each class of passenger. In response to forecasts of passenger numbers on any given flight, the production unit follows a series of complex steps to produce trayed meals and non-food items ready for transportation to the aircraft.

Transportation is usually carried out by using specialist high-loader catering trucks that enable trolleys to be rolled on and off aircraft. Once loaded, trolleys and other items need to be stowed on board to ensure the microbial safety of edible items and the security and safety of the crew, passengers, and aircraft. At the designated time during the flight, the cabin crew then carries out the service of meals, snacks and other items. Upon arrival at its destination, each aircraft is then stripped of all the equipment and trolleys, which are returned to the production units for cleaning and re-use. In achieving this, it is necessary to understand the impact of flying on the physiology of the passenger, to manage a complex supply chain, ensure the safety and quality of the product, utilities increasingly sophisticated information and communication technologies, and engage in on-going research and development.

Customers. **The Flight Catering System. Figure (2.5)**

#### **6.5 Ordering Goods**

- a) The ordering procedure should be similarly formalized with the use of purchase orders.
- b) Three copies of the purchase order are required

1. for the supplier.
2. for the person responsible for receiving.
3. For the accounting office, to be attached to the invoice when it is received for payment.

One question that does arise in the ordering process is the quantity to order.

This is often left to the discretion of the department head involved, either because he has authority to order directly what is needed, or because he is in the best position to advise the purchasing department of required quantities. The quality required is not too difficult to determine from previous experience.

**A In summary, specifications should include the following items:**

1. The name or description of the item required.
2. The specific quantity required.
3. The frequency with which the item is required.
4. Where it is important, the size, weight, amount or number of the items required.
5. Where it is important, the form that the items should take (for example, whether an item of food should be fresh, frozen or canned).

**B The main advantages of specifications are:**

1. Required those who prepare them to think carefully and document exactly what their product requirements are.
2. Leave no doubt in suppliers' minds about what they are quoting on thus reducing or eliminating misunderstanding between supplier and establishment.
3. Eliminate, for frequently purchased items, the time that over the telephone or directly to sales persons each time the product is needed.
4. Permit competitive bidding.

5. Allow the person responsible for receiving to check the quantity of delivered goods against a written description of the quality desired.

## **6.6 adequate Stores:**

Catering should have adequate storage facilities for all stores. If storage spaces are inadequate, stock levels should be reduced by taking on stores more frequently or if that is not possible, additional storage should be made available. All stock should be rotated when necessary.

### **6.6.1 Cold Stores:**

Safe temperatures for cold stores are generally considered to be 5°C or colder and minus 18°C or colder for chill and freezer cabinets respectively but a slight tolerance of one or two degrees is unlikely to create any significant risk to food safety. If cabinets do not have a means of checking temperatures, a suitable thermometer should be provided. Thermometers should be calibrated periodically but a simple check on a monthly basis, using boiling water (99°C to 101°C) or melting ice (-1°C to +1°C) will verify the accuracy of the thermometer.

In freezer units, the combination of high humidity and fluctuating temperatures (warmer than minus 10°C) accelerate mould and other spoilage bacterial growth. Fluctuating temperatures may also cause an accumulation of ice deposits. Food should never be stored in front of cooling units as this restricts the circulation of air. Suitable packaging is essential to avoid the loss of moisture from the surface of food, which can produce a freezer burn effect on exposed meat cuts or joints.

**If defrosting is not an automatic process, equipments should be defrosted regularly to maintain its efficiency**

1. Although fridges and freezer cabinets should be maintained according to the catering planned maintenance system, cooks and others working in the galley should regularly check the condition of door seals and closing devices as well as routinely monitoring temperatures.

2. Chilled raw food must always be kept apart from cooked food, for example, cooked food or milk that requires no further treatment before consumption. Separate refrigerators are preferred. Food should also be covered or wrapped to prevent drying out, cross-contamination and absorption of odor.
3. All refrigerated room doors should be fitted with means both of opening the door and sounding an alarm from the inside.

#### **6.6.2 Dry Stores:**

Dry food stores should be dry, cool, (where possible around 10°C), well lit and ventilated.

There should be adequate shelving and pallets to avoid stowage directly on to the floor. Care should be taken to ensure stock is used in strict date rotation and that supplies have the best possible durability date. Perishable provisions should neither be ordered nor accepted in quantities greater than can be consumed before the expiry date. Daily checks should be made on short-life perishable food such as fresh fruit and vegetables.

#### **6.7 Economical Order Quantity (E.O.Q):**

There are costs involved in carrying an inventory of supplies of any kind. These costs include the cost of money that is either borrowed to carry the inventory or that is tied up by the firm and thus not available for the purpose. There are also costs associated with having to store the inventory, such as the necessity to include storage areas in the building (thus increasing the building costs), inventory insurance, labor costs (storekeepers and other personnel) and the cost of control forms (for example, perpetual inventory cards and requisitions). These costs could generally vary from 10 to 30 percent of the value of the inventory.

The economic order quantity equation can be used, where appropriate to minimize the costs associated with purchasing and carrying inventories.

**The equation is:**

$$\text{E.O.Q} = \sqrt{\frac{200 \cdot y \cdot c_s}{I \cdot C}}$$

**Whereas:**

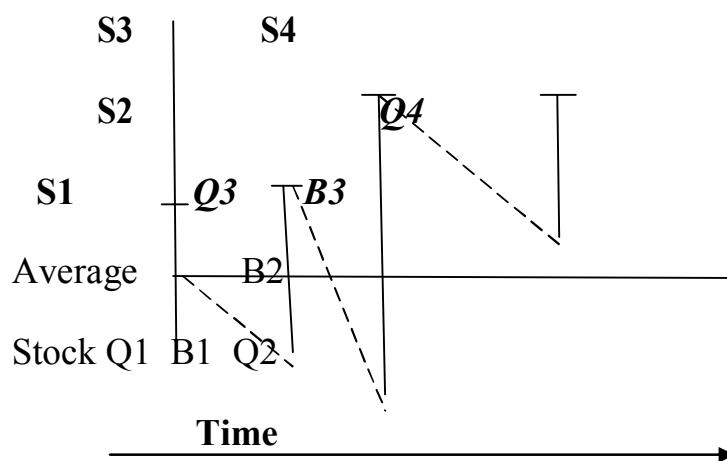
**Cs = Order cost.**

**I = Storage cost (%) /year.**

**C = Unit cost.**

**Y = Annual consumption.**

**Stock quantity**



**The stock time curve**

$$S2 = Q2 + B1$$

$$S3 = Q3 + B2$$

$$S4 = Q4 + B3$$

**Cs = Order cost.**

**C = Unit cost.**

**I = Storage cost (percentage) (%) / year.**

**B = Size of Buffer stock.**

### **i. Buffer stock average (Bi)**

Average amount of stock tied up to act safety stock caution against variation in the usage rate and other parameter.

$$\text{Storage average} = Q/2 + B$$

$$\text{Number of orders} = Y/Q$$

$$\text{Annual order cost} = Y/Q \cdot j \cdot C_s$$

$$B = \text{Buffer Stock} = 2.33 \cdot \delta R \cdot \sqrt{L}$$

$\delta R$  = Standard Deviation.

$L$  = Waiting Time.

$$C.T = (Q/2 + B) \cdot C.I/100 + Y/Q \cdot C_s$$

Differentiating Ct against Q and equating the result to Zero.

$$- Y/Q^2 \cdot C_s + CI/200 = \text{Zero}$$

$$\begin{aligned} \text{E.O.Q} &= \sqrt{\frac{200 \cdot y \cdot C_s}{IC}} \\ &= \frac{B1 + B2 + B3}{3} \end{aligned}$$

$$Q_j = \frac{Q1 + Q2 + Q3 + Q4}{4}$$

**When we apply this on catering section:**

**Let us assume the catering produce 5000 meal/day (for departure and arrival flights).**

**This meal includes:** (Table 2)

1. Hot meals.
2. Pastries.
3. Breads.
4. Cold meals.

**Another items such as, soft drink, mineral water, and non-food items, Foils, Cutlery and cups....ect.**

1. Hot meals contains: (Table 2)

Kerry chicken, Kuffta, Kebab, Rice and Fried potato (They are not prepared at same time).

### **6.8 The Meal production cost factors**

1. Daily Items plus perishables (Small amount).
2. Annual Items stock (Large amount).
3. Running cost such as, Labor, Lighting, Cooling ..... ect.

#### **a. The seasons:**

1. Winter season start from Oct. – Mar.
2. Summer season start from Apr. – Oct.
3. Hajj and Omera season.

**b.** The number of aircraft fleet and firm financial situation.

**c.** The well qualified and trained employees.

**d.** The storage conditions, capacity and availability.

**Let us take one item from large amount stock to produce 5000 meals / day**

**Ex. Edible Oil**

1. Sudan airways catering needs 5 bottle edible Oil / day (weight 4lb).
2. The monthly consumption is  $5 * 30 = + 150$  bottles / month.
3. The annually consumption is  $150 * 12 = + 1800$  bottles / year (360 bottle extra).
4. The one bottle price 75 SDG.
5. + 450 edible oil bottles every four months.
6. The annually order cost = order number cost \* one unit cost =  $4 * 75$  SDG = 300 SDG.
7. The total annual cost = the annual order cost + Storage cost
8. The storage cost =  $(Q/2 + B) * C * I/100$  **where as:**

Q = Total of quantity.

B = Total size of Buffer stock.

C = One unit cost.

I = Running cost (10% – 30% from total annual consumption cost)

CT = Total Cost / year.

**Theme five:**

## **7. Material & Methodology of the Research:**

Figure 2.7 indicates the methodology and procedures in conducting the research. It starts with a detailed literature review of T.Q.M that requires a general understanding of T.Q.M. Next, the objective and scope of research is defined to give a clearer picture of the research. All related quality issues in Sudan airways company; especially related to Catering section were being gathered to learn about the current trend of catering quality activities. Further to that, all the T.Q.M concepts will be compiled to suit the objective and scope of research as well as



providing a guideline for future review. Questionnaires are being prepared after determining the type of approach and style that is suitable for the research survey.

The questions designed with a purpose to check on the level of understanding and implementation of T.Q.M in catering section. The first draft of the questionnaire (after approved by direct supervisor) was sent to some of the Quality experts. All comments and suggestions were taken into consideration and corrections identified toward the improvement of questionnaire. After revising and combining all useful feedback, the final questionnaire was distributed to the number of 210 Customers (Passengers) eventually, the survey carried out within three weeks. While waiting for the survey's response, computer software of the Statistical Package for Social Sciences (SPSS) for the purpose of the research is familiarized in the preparation for analysis. This chapter presents a detailed description of the procedures followed by the questionnaires to conduct the study field by definition of curriculum and describe the study population and to identify the study sample and tools of the study questionnaire, and the statement of the study procedures and statistical methods which was used in data processing to make sure of the credibility and stability and prove hypotheses and results.

## **7.1 The study field procedures:**

### **7.1.1 Study Approach:**

The researcher used descriptive analytical method, which based on descriptive statistics and inferential statistics In order to describe the phenomenon under study, analyze the data, and identify the relationship between the components and operations contained and the resulting effects.

### **7.1.2 The study population:**

The study population of arrival passengers through Khartoum International Airport who have already travel by Sudan air, whether traveling lines Sudan air or other foreign companies have been distributed tow hundred a random sample forms of equality of passengers arrival flights at several time during the week.

The estimated number of about six hundred Passengers trips has included the arrival as well as the passengers of Sudan airways Company.

Other companies like; Egypt Air, Ethiopian, Saudi Arabia, Qatar airways, the Emirates and the Gulf airways without discrimination.

Tow hundred questionnaires collected and some of fourteen questionnaires excluded for not filling.

One hundred and eighty six questionnaires analyzed.

### **7.1.3 The study tool:**

After reviewing, the literature of overall quality and Administrative Sciences found on any available studies and an internet survey, the researcher built resolution according to the following steps:

1. Identify the main themes of research problems and hypnosis that covered by the resolution.
2. Each axis includes the drafting of the terms and phrases separately.
3. The preparation of the questionnaire in the initial image and displayed on the professor (research supervisor) firstly then to some quality experts.

Display resolution, after consultation with the three arbitrators from inside and outside the Sudan University of Science & Technology.

### **7.1.4 Study statistical methods:**

Several statistical methods were use to get the results that achieve the objectives of the study, by statistical Package for Social Sciences (SPSS).

#### **This includes the following:**

1. Cronbach's coefficient alpha used to test the consistency of the questionnaires.
2. Percentages, the mean, dispersion measures, central tendency and graphical Column to analyze each paragraph of the questionnaires. The mean for each

axis used for calculating the views and attitudes of respondents.

3. Chi square used to prove hypotheses to accept or reject the null  $H_0$  and alternative hypothesis  $H_1$ .

## 7.2 Display and analyze a sample of the field study data

**Table (7.1)**

**Scale: All Variable**

### **Case Processing Summary**

		<b>N</b>	<b>%</b>
Cases	Valid	184	98.9
	Excluded <sup>a</sup>	2	1.1
	<b>Total</b>	<b>186</b>	<b>100.0</b>

Listwise deletion based on all variables in the procedure.

### **Reliability Statistics**

<b>Cronbach's Alpha</b>	<b>N of Items</b>
.794	14

**Table (8.2) Descriptive Statistics****Reliability**

	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>Minimum</b>	<b>Maximum</b>
Gender	185	1.39	.489	1	2
Age	186	2.30	1.165	1	5
Education	185	2.69	.971	1	4
Occupation	186	3.11	1.444	1	5
Response	186	3.17	1.187	1	5
Communication	186	3.24	1.157	1	5
Quality	186	3.18	1.176	1	5
Time	186	3.32	1.486	1	5
Observations	186	3.03	1.327	1	5
Meals	186	3.24	1.114	1	5
Evaluation	186	3.32	1.158	1	5
Confidence	186	3.39	1.190	1	5
Opinion	186	3.52	1.182	1	5
Future	186	2.56	1.208	1	5

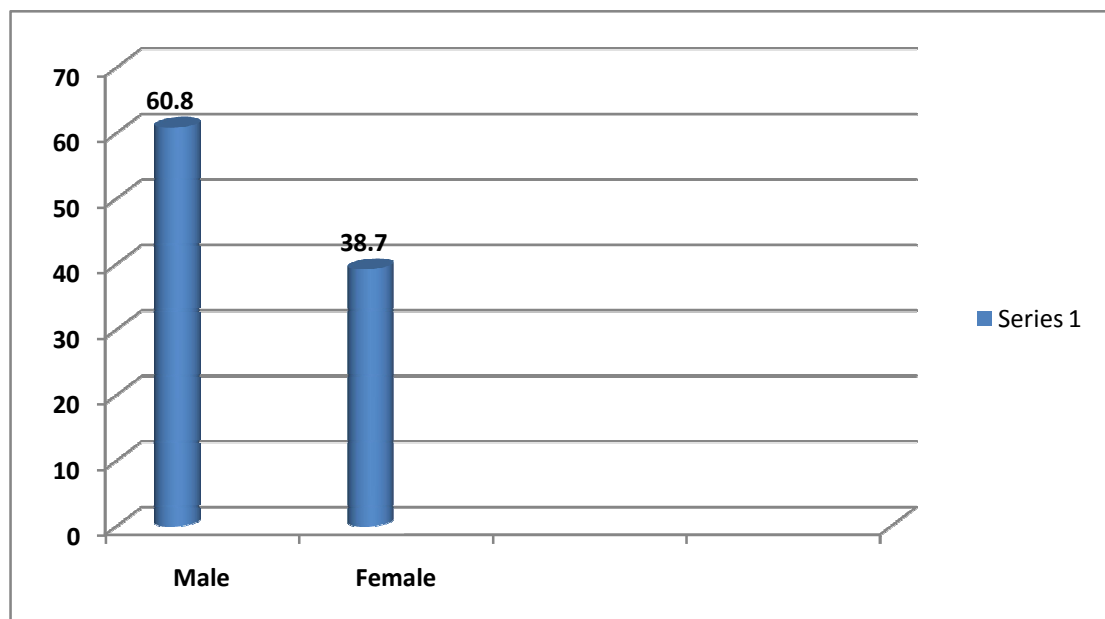
Source: prepared by the researcher (SPSS Tools).

## Chi-Square Test Frequencies First: Personal characteristics

**Table (8.4) Gender**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	113	60.8	61.1	61.1
	Female	72	38.7	38.9	100.0
	Total	185	99.5	100.0	
Missing	System	1	.5		
<b>Total</b>		<b>186</b>	<b>100.0</b>		

**Chart (8.3)**



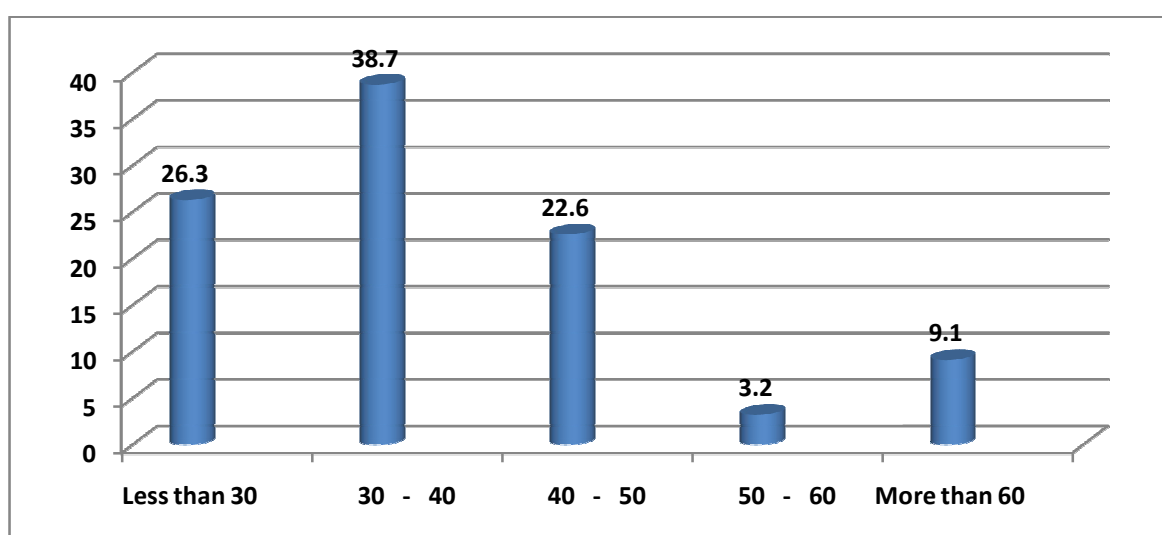
Source: prepared by the researcher (SPSS Tools).

The table (8.4) and chart (8.3) above shows that the percentage rate of the males was 60.8% while the female rate was 38.7%. The big difference is due to the some of the female cast their opinions either for their preoccupation with their children traveling with them because of old age, shame, or educational level.

**Table (8.6) Age**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than ٣٠	49	26.3	26.3	26.3
	30 - ٤٠	72	38.7	38.7	65.1
	40 - ٥٠	42	22.6	22.6	87.6
	50 - ٦٠	6	3.2	3.2	90.9
	More than 60	17	9.1	9.1	100.0
	<b>Total</b>	<b>186</b>	<b>100.0</b>	<b>100.0</b>	

**Chart (8.5)**



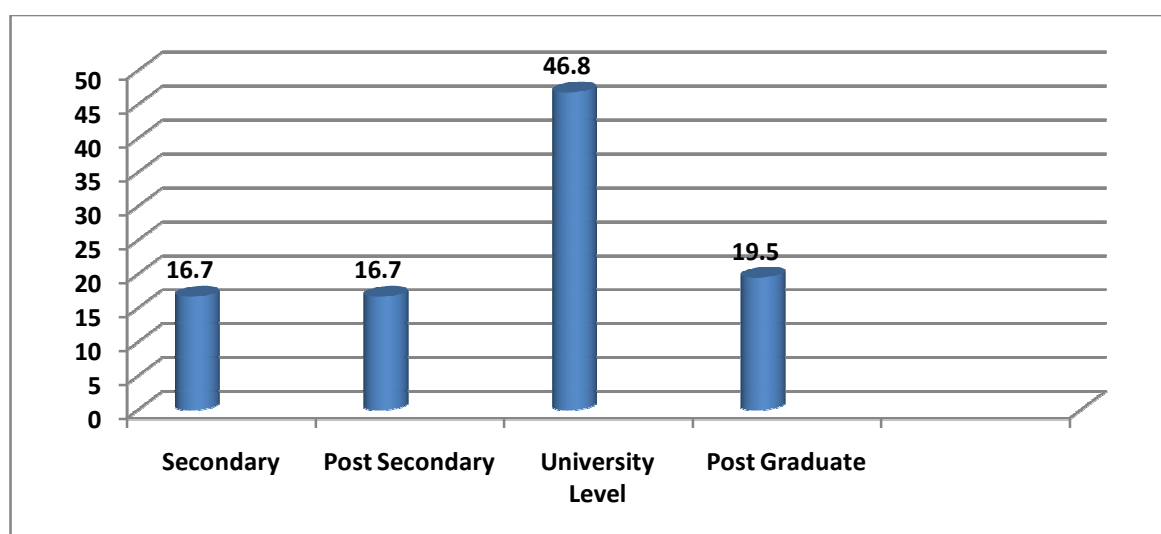
Source: prepared by the researcher (SPSS Tools).

Notes from the table (8.6) and Chart (8.5) the category of passengers 30 and less than 40 They are the most frequent and represented the highest proportion of 38.7 and category of (Less than 30) It reached (26.3); and 50 - 60 about 3.1%.

Most of the Sudan airways' passengers above the twenty and less the forty years old. Which entails Sudan air assumed that great attention without neglecting other categories.

**Table (8.8) Education**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Secondary	31	16.7	16.8	16.8
	Post Secondary	31	16.7	16.8	33.5
	University Level	87	46.8	47.0	80.5
	Post Graduate	36	19.4	19.5	100.0
	<b>Total</b>	185	99.5	100.0	
Missing	System	1	.5		
<b>Total</b>		<b>186</b>	<b>100.0</b>		

**Chart (8.7)**

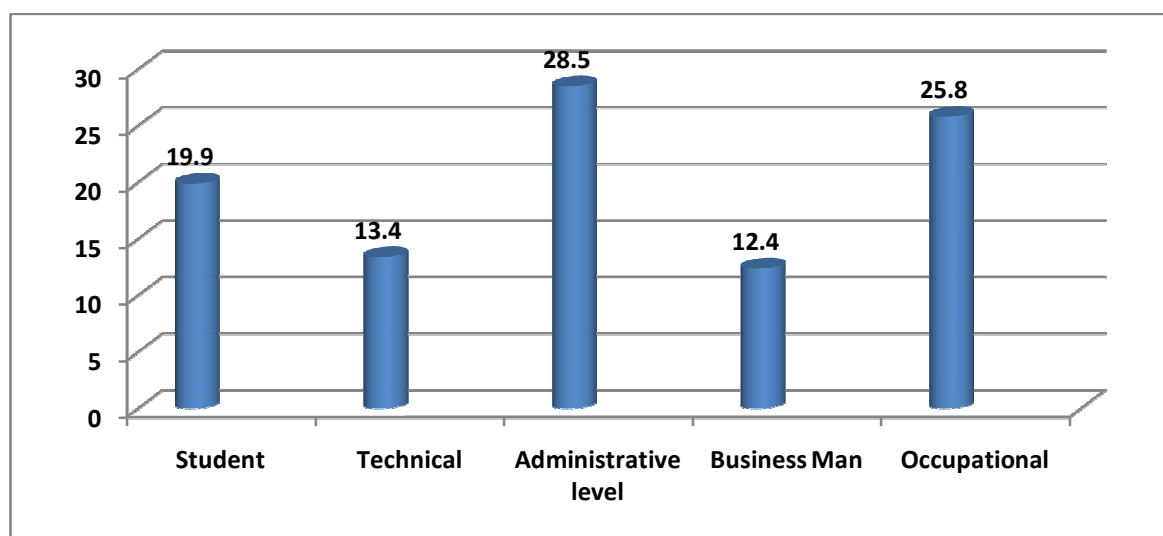
Source: prepared by the researcher (SPSS Tools).

Notes from the above table (8.8) and the chart (8.7) that the passengers reached the secondary ratio 16.7% at university level and the post graduate diploma level was 19.4% secondary 11.0%, while the percentage of the secondary level who are the less percentage of 16.7%



**Table (8.10) Occupation**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Student	37	19.9	19.9	19.9
	Technical	25	13.4	13.4	33.3
	Administrative level	53	28.5	28.5	61.8
	Business Man	23	12.4	12.4	74.2
	Occupational	48	25.8	25.8	100.0
	<b>Total</b>	<b>186</b>	<b>100.0</b>	<b>100.0</b>	

**Chart (8.9)**

Source: prepared by the researcher (SPSS Tools).

The above table (8.10) and chart (8.9) show that there was a convergence in the ratios between the three professions were: administrative 28.5 %, vocational reached 25.8 % and technician reached 13.4 %, while the percentage of businessmen 12.4%, which is a reasonable proportion of this important travelers who travel frequently, so the greatest attention and consideration must be provided to them without neglecting other categories.

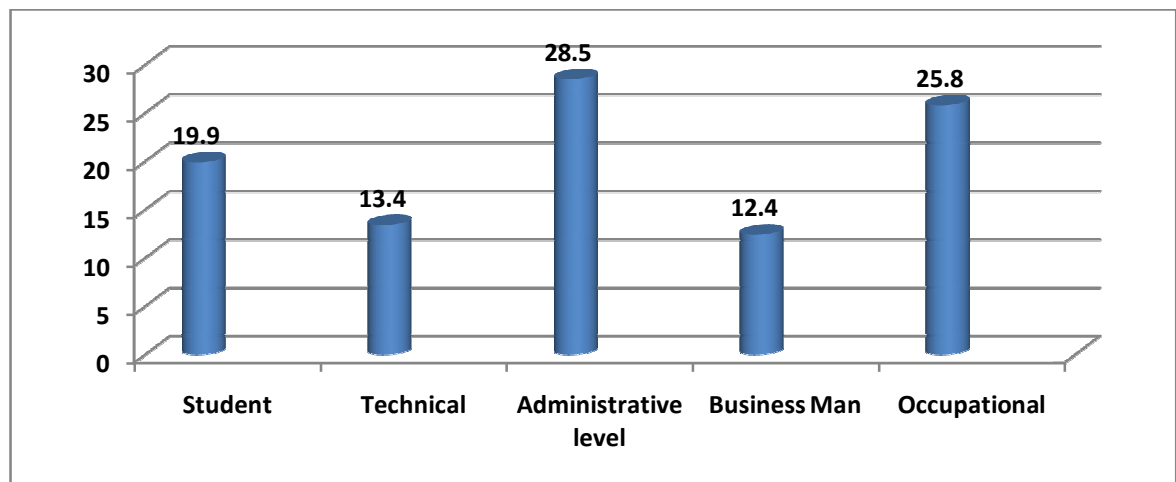
## Second: Analysis of the study question axes

**Q.1b** communicating clearly and effectively?

**Table (8.11) Communication**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Unacceptable	10	5.4	5.4	5.4
	Week	48	25.8	25.8	31.2
	Acceptable	45	24.2	24.2	55.4
	Good	54	29.0	29.0	84.4
	Excellent	29	15.6	15.6	100.0
	<b>Total</b>	<b>186</b>	<b>100.0</b>	<b>100.0</b>	

**Chart (8.10)**



Source: prepared by the researcher (SPSS Tools).

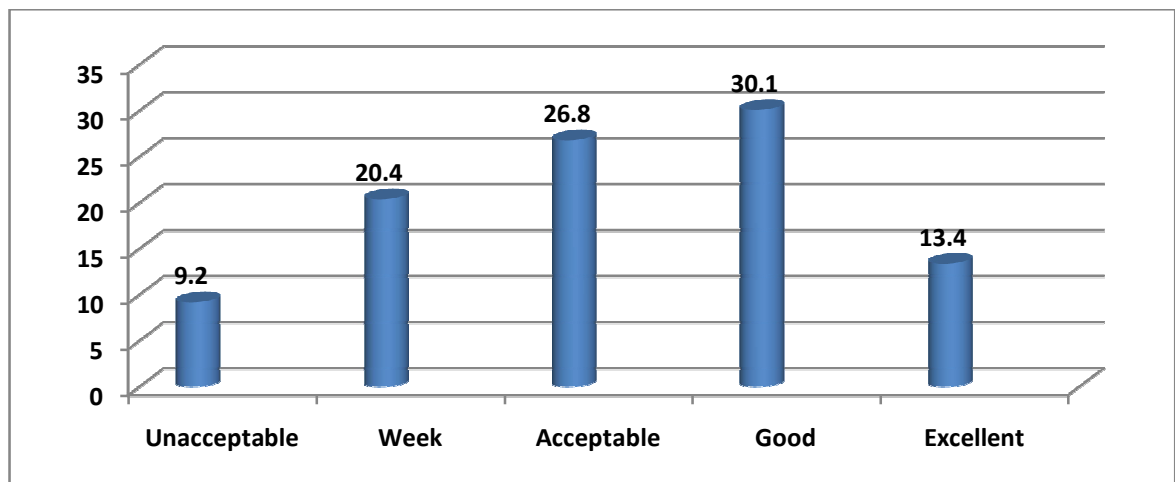
Table (8.11) and chart (8.10) show the evaluation of communication percentage rate between passenger and cabin crew reached 25.8% (week assessment), 24.2% (acceptable assessment) 29.0% (good assessment) notes convergence ratios between these three categories so, the cabin crew staff need more training on customer care and effective communication with customer (Passenger).

**Table (8.13) Quality**

Q.ic Keeping you informed of progress in quality of Product and service?.

		Frequency	Percent	Valid Percent	cumulative Percent
Valid	Unacceptable	17	9.2	9.2	9.2
	Week	38	20.4	20.4	29.6
	Acceptable	50	26.8	26.8	56.4
	Good	56	30.1	30.1	86.5
	Excellent	25	13.4	13.4	100.0
	Total	186	100.0	100.0	

**Chart (8.12)**



Source: prepared by the researcher (SPSS Tools).

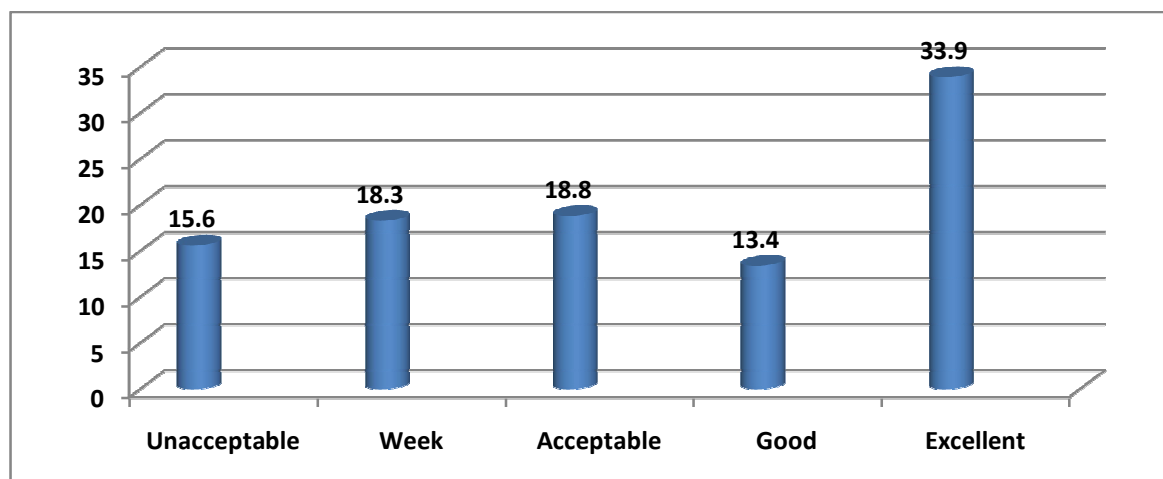
Table (8.13) and chart (8.12) show the total quality of the meals physically (Test, Odor, The meal contents, tray set-up ...ect) the rate of percentage as the highest percentage rate (56%) , Acceptable (50%) while the week response was (38%) so, this is high percentage Specially in the present of acceptable result (50%), because it contains both Satisfied and not satisfied therefore, this will need more investigation about Meals preparation, An employee training, suitable meals to passenger, tray set-up, and it is equipments.

**Table (8.15) The Time**

**Q. ie The flights meeting timescales (Departure and Arrival).**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Unacceptable	29	15.6	15.6	15.6
	Week	34	18.3	18.3	33.9
	Acceptable	35	18.8	18.8	52.7
	Good	25	13.4	13.4	66.1
	Excellent	63	33.9	33.9	100.0
	<b>Total</b>	<b>186</b>	<b>100.0</b>	<b>100.0</b>	

**Chart (8.14)**



Source: prepared by the researcher (SPSS Tools)

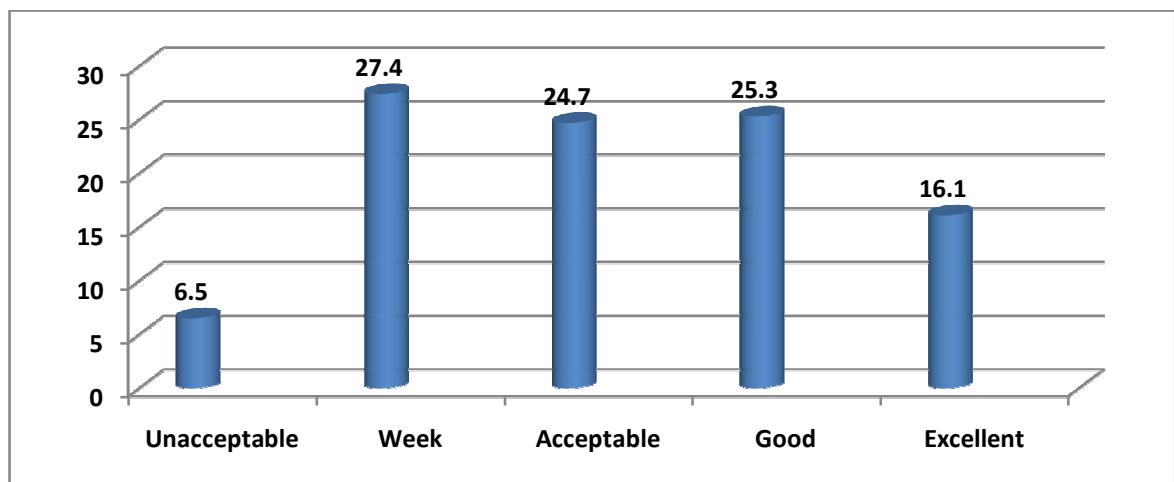
Table (8.15) and Chart (8.14) show the ratio rate of the flight timetable accuracy. Despite the lack of punctuality of Sudan airways flights timetable and this is the most prominent defects However, there are 33.9% strongly agree to Sudan air punctuality and this is will be confused result. This may be due to the rarely of traveling time and not to delay on their trips, this will justify their strongly approval here. In addition, there were week acceptance; their ratio was (18.3) and the acceptable one was (18.8) therefore, any administrative effort must be implemented to remove this serious problem to occur.

**Table (8.17) Responsiveness**

**Q. id** Responding promptly to your requests:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Unacceptable	12	6.5	6.5	6.5
	Week	51	27.4	27.4	33.9
	Acceptable	46	24.7	24.7	58.6
	Good	47	25.3	25.3	83.9
	Excellent	30	16.1	16.1	100.0
	<b>Total</b>	<b>186</b>	<b>100.0</b>	<b>100.0</b>	

**Chart (8.16)**



Source: prepared by the researcher (SPSS Tools).

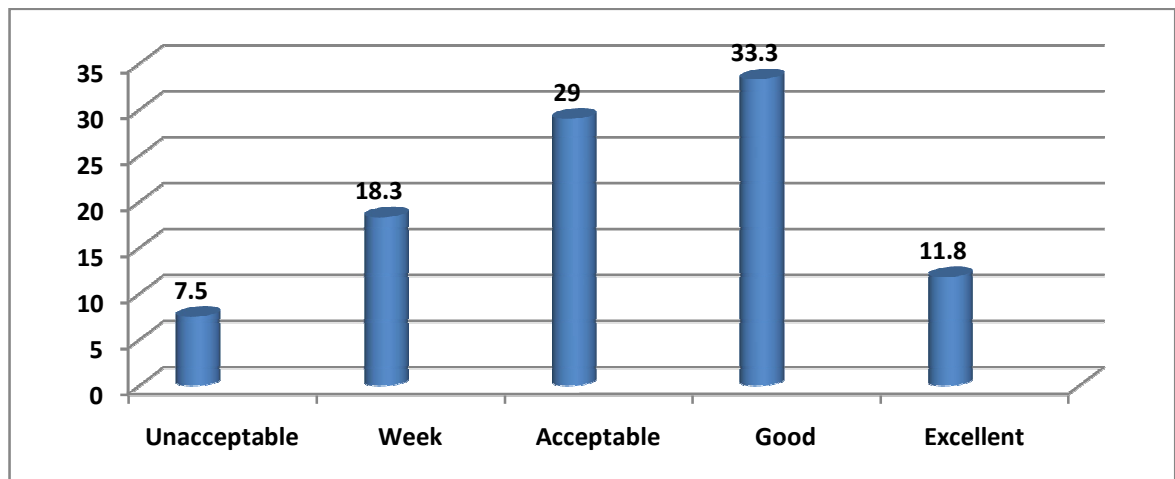
Table (8.17) and Chart (8.16) show the percentage rate as follows: week was (27.4%), acceptable (24.7%) and good one (25.3%) approximately, they were very near ratio but the week response took the highest rate, thus the cabin crew (Hosts) must obtain more training about customer care, communication and any necessary training related to duties.

**Q.id** Meals suitable to Sudanese taste.

**Table (8.19) The Meal**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Unaccp-table	14	7.5	7.5	7.5
	Week	34	18.3	18.3	25.8
	Accept-able	54	29.0	29.0	54.8
	Good	62	33.3	33.3	88.2
	Excell-ent	22	11.8	11.8	100.0
	<b>Total</b>	<b>186</b>	<b>100.0</b>	<b>100.0</b>	

**Chart (8.1^)**



Source: prepared by the researcher (SPSS Tools).

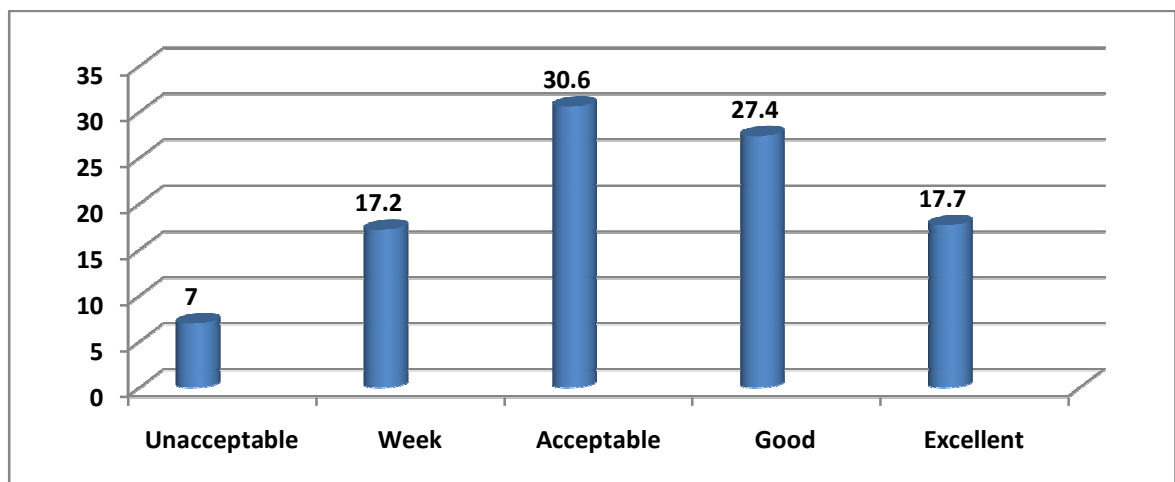
Table (8.1^ ) and Chart (8.1^ ) shows the Percentage rate of quality meals, which evaluated by external customer as follows, the week ratio is (18.3), the acceptable one is (29.0) and the good is (33.3) , so the company head and ground handling directorate have to take more attention about customer satisfaction and retention by many means of communication, such as questionnaire. The above week ratio was very high and acceptable one because this includes the dissatisfied beside satisfied and this represent high risk of assessment of the overall evaluation of the quality meals.

**Q. ih** Overall, what do you think is the rate of our performance?

**Evaluation Table (8.21)**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Unacceptable	13	7.0	7.0	7.0
Week	32	17.2	17.2	24.2
Acceptable	57	30.6	30.6	54.8
Good	51	27.4	27.4	82.3
Excellent	33	17.7	17.7	100.0
<b>Total</b>	<b>186</b>	<b>100.0</b>	<b>100.0</b>	

**Chart (8.20)**



Source: prepared by the researcher (SPSS Tools).

Table (8.21) and Chart (8.20), shows the percentage rate of the general evaluation of the company and hosts, as follows: week was (17.2%), acceptable (30.6%) and good one (27.4%) approximately, they were very near ratio but the week response took the same percentage rate to excellence assessment, therefore, the cabin crew (Hosts) must obtain more training about customer care, communication, and any necessary training related to their duties , in addition to, the company top management must take decision to improve overall quality and safety products and services to gain customer satisfaction and retention.

## **Theme six:**

### **1.3 Results of the study (The findings reveal that):**

1. Results of the study showed that the selection of passengers for Sudan airways negatively affected by a factor of lack of accuracy of flight timetables.
2. The study showed that there was not well-trained cabin crew to present excellence services, better communication, response, the best moral attitude...est with passenger so as to gain their satisfaction and retention.
3. The study showed that an increase in passenger satisfaction that lead to the opportunity to choose Sudan airways.
4. The study showed a significant weakness in the application of total quality management policies of the company, which had a negative impact on the company's development services provided to the client and the level of satisfaction.
5. The study showed that most of the Sudan airway' passenger assigning the company crisis to the government negligence and not support it financially.
6. The study showed that neglect to address the performance deficiencies on time and slowdown to solve passenger's problems immediately leads to lose customers and increases the losses, there for bad reputation.



### **Open Question of Passengers:**

**Please, would you tell me if you have any proposal to develop Sudan Airways Company?**

1. Twenty passengers believe that the solution to the problem of Sudan air in its commitment to accuracy in appointments.
2. Fourteen passengers see the solution in the attention of training and raising the efficiency of the workforce.
3. Fifteen-three passengers see the solution in bring the latest aircraft.
4. Twelve passengers see the solution in improving services and credibility with the client.
5. Ten passengers see the solution in the appointment of qualified management and have previous experience in the field of aviation.
6. Eight passengers see the solution to change the negative perception towards the company and the government should be recognized company's national carrier and give him the right to the privileges and support financially.
7. Nine passengers believe the solution lies in giving Sudan air management freedom in decision-making and lack of government interference in the operational work.
8. Four of the passengers see the solution in the best use of the resources of the company and take advantage of the inherent powers.
9. Thirteen of the passengers see the solution in a strategic partnership with one of the global airline business or the relevant aviation field or ask a public shareholding company.
10. Five of the passengers feel the need to follow the example of the international airlines' company and the transfer its successful experience in Sudan airways.

**Table (8.22)****Test Statistics**

	<b>Gender</b>	<b>Age</b>	<b>Education</b>	<b>Occupation</b>	<b>Responsev- ness</b>	<b>Communication</b>
Chi-Square	9.086 <sup>a</sup>	74.054 <sub>b</sub>	48.232 <sup>c</sup>	19.269 <sup>b</sup>	28.247 <sup>b</sup>	34.054 <sup>b</sup>
df	1	4	3	4	4	4
Asymp. Sig.	.003	.000	.000	.001	.000	.000

	<b>Quality</b>	<b>Time</b>	<b>Observation</b>	<b>Meal</b>	<b>Evaluation</b>
Chi-Square	28.892b	24.108b	10.452b	45.075b	32.602b
df	4	4	4	4	4
Asymp. Sig.	.000	.000	.033	.000	.000

1. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 92.5.
2. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 37.2.
3. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 46.3.

## **7.4 Analyzing the results of the questionnaire:**

### **Hypotheses Test of the Field Study:**

#### **7.4.1 The hypothesis:**

T.Q.M and Continual Improvement (C.I) implementation leads to an increase the company's customers rate and retention of the old customer therefore, these lead to decrease the cost and increase the overall profitability.

Source: prepared by the researcher (SPSS Tools).

**The above hypotheses according to outcome of questionnaire analysis can be converted to a statistical relationship as follows:**

#### **Null hypothesis ( $H_0$ ):**

There is no statistically significant a positive relationship between application of total quality management and continues improvement to increase customers satisfaction and retention rate and decrease costs, so increase profits.

#### **Alternative hypothesis ( $H_1$ ) :**

There is statistically significant positive relationship between application of total quality management, continues improvement and increase Customers satisfaction and retention rate and decrease costs, so increase profits.

TheTable (8.22): shows that the **Chai Square** test, Standard deviation and significance values. All the significant values less than 0 .05 at 95% degree of confidence, therefore, reject the null hypothesis ( $H_0$ ) and accept the alternative hypothesis ( $H_1$ )

Therefore, all hypotheses are right; and when the Sudan airways' top management, catering head section and employees committed to implement and conduct the total quality management and continual improvement practices these will lead to customer satisfaction, retention, so the revenue and profitability will be increased.

## **Theme Seven**

### **Conclusion**

The study came out in many results that was shed a light on the fundamental factors affecting the application of the **Total Quality Management System (T.Q.M)** in the Sudan Airways company, which

Reflected negatively on the development of the company's services and customer satisfaction, It also came out with many of the recommendations that we hope will serve as a working paper for the company to improve performance and continual improvement and leading to the high performance level according to the desired total quality management requirements.

## **Theme Eight**

### **Recommendations**

1. The cabin crew staff need more training on customer care and effective communication with customer
2. (Passenger) so, this will enhance customer satisfaction and retention.
3. Internal customer (An employee) needs training on all catering issue such as, food preparation, personal hygiene, environmental management system (E.M.S), food quality control and assurance and total quality management philosophy and culture practices. They need also internal comfortable environment, motivate them...ect.
4. Establish new catering because the current one is not suitable for human being and food preparation and storage.
5. The company should establish a department of customer relationships to conduct customer's (passengers) survey and determine their needs, wants, beyond their expectations and solve their problems and actively participate in market research and strategic decision-making in order to be the nucleus of the overall service quality, especially as it is the basic foundation for the company to apply the principle of focusing on the customer.
6. Should the government represented by the Ministry of Finance to support Sudan airways as the national carrier financially, provide it with all the facilities and exemptions from government fees, and provide payment of debt internally and externally and its commitments to develop clear plans for the renewal of the aircraft fleet and the availability of funding sources to do so.
7. The company must define its destination and its strategic objectives and define clearly is a service company or profit, or both together?
8. Set a clear strategy to focus on improving services in ground handling,

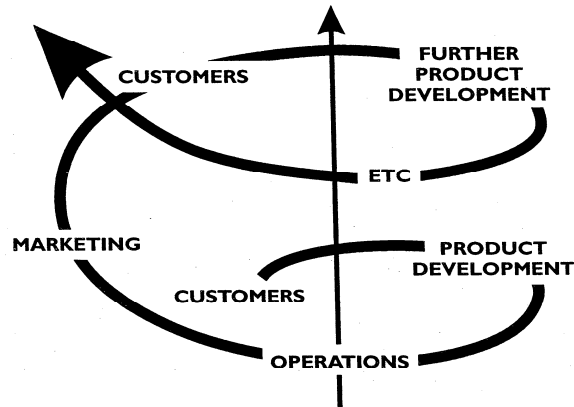
which include, catering section and equipment ...ect

9. Improve performance and enhance the level of services and to improve its reputation and financial situation to strengthen it and even can compete strongly and to do its mission as a Sudanese national carrier.
10. Full focus on training, the workers skills, support the efficiency of the workforce and work on Continuity of generations and the transfer of expertise and stimulate the eminent and encouraging employees to create ideas and innovations.
11. Further, a clear strategy should be developed to improve services by focusing on high performance of the frontline service providers to clear the negative image of the company. That should be achieved by the commitment of a qualified top management to raise staff efficiency by training motivation and empower them, besides Government's support to avail hard currency flow, work facilities and taxes exemptions , modernizing the fleet, saving reserve aircrafts and spare parts to maintain on time performance and excellent service, as the opportunity is still there for the company's renaissance.

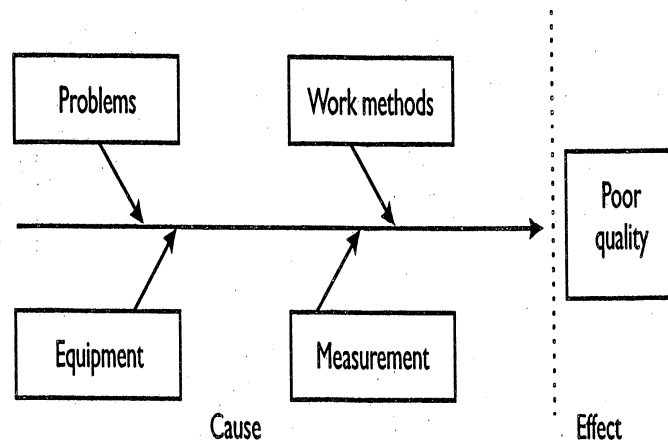
## Appendixes

### List of Diagrams

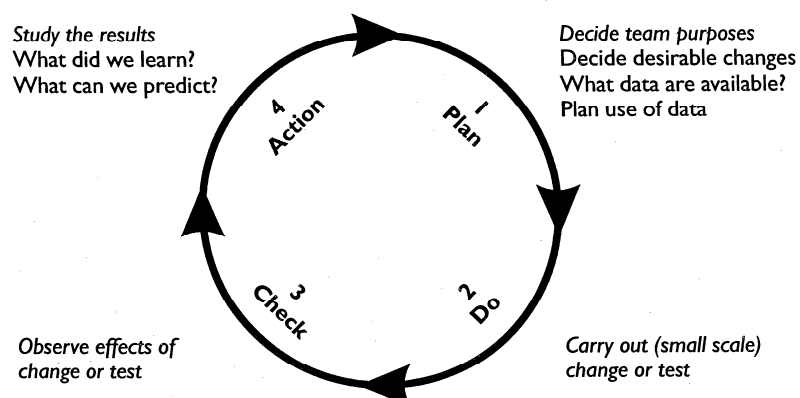
**Diagram (2.1) the Quality Spiral Juan's Quality Planning Road Map**



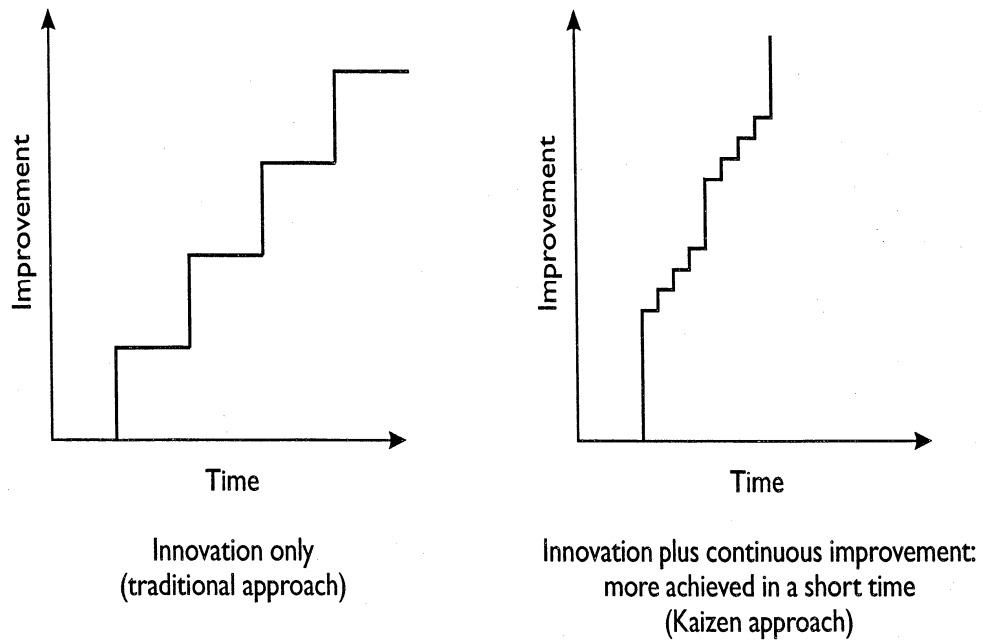
**Diagram 2.2 the Fish bone diagram**



**(Diagram 2.3) The P.D.C.A Cycle**



**Diagram (2.4) Comparisons between Innovation and Continuous Improvement**



**Diagram (2.5) demonstrate the T.Q.M programme and continual improvement**



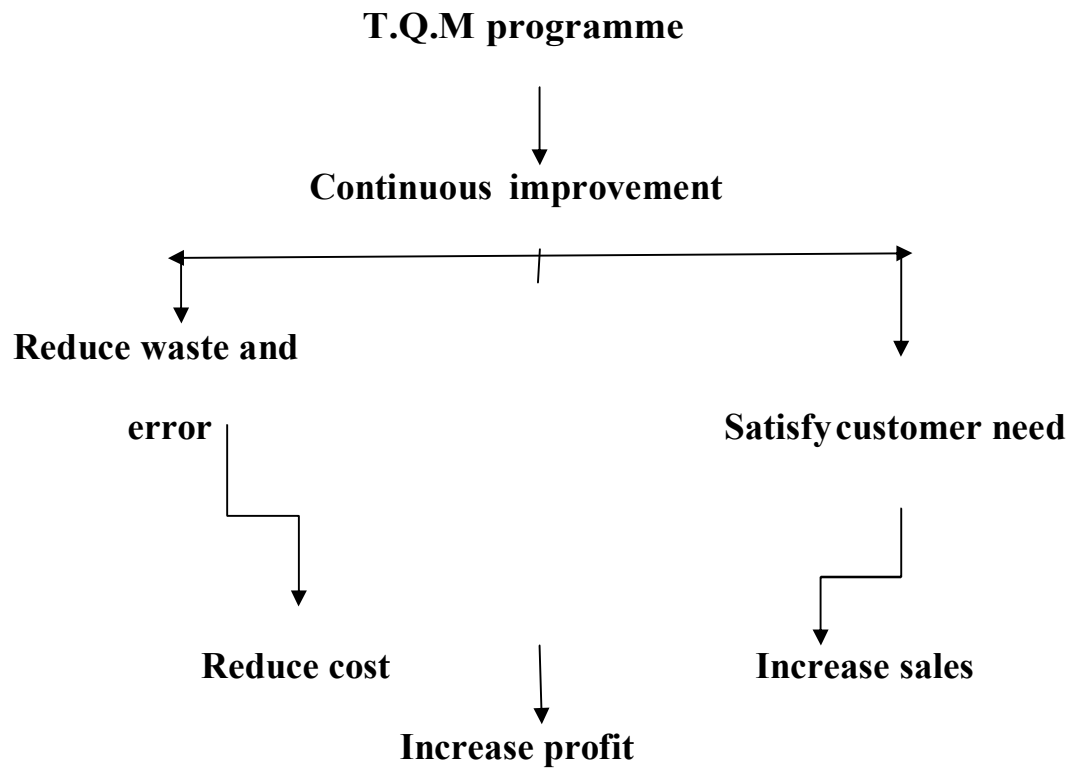
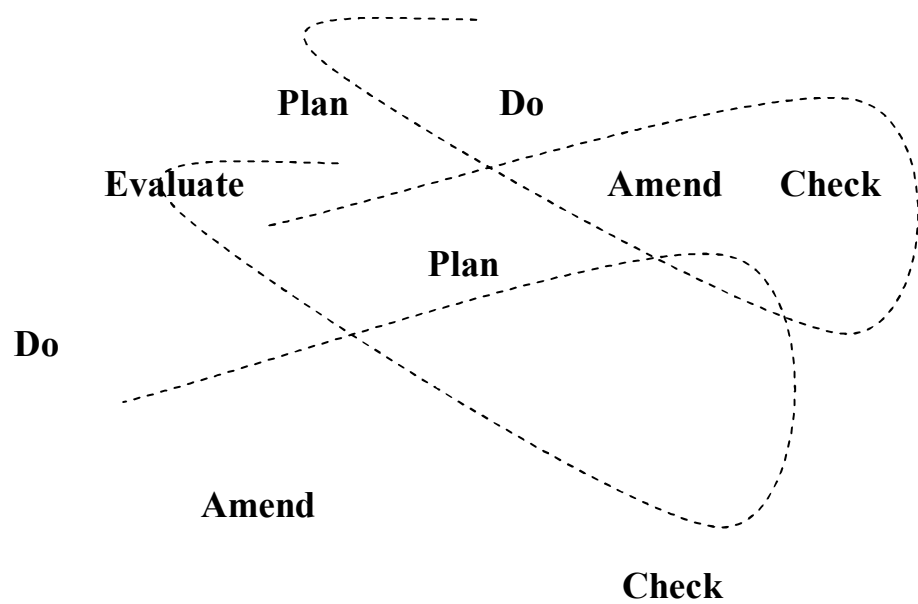


Diagram (2.6) demonstrate the spiral of never-ending improvement

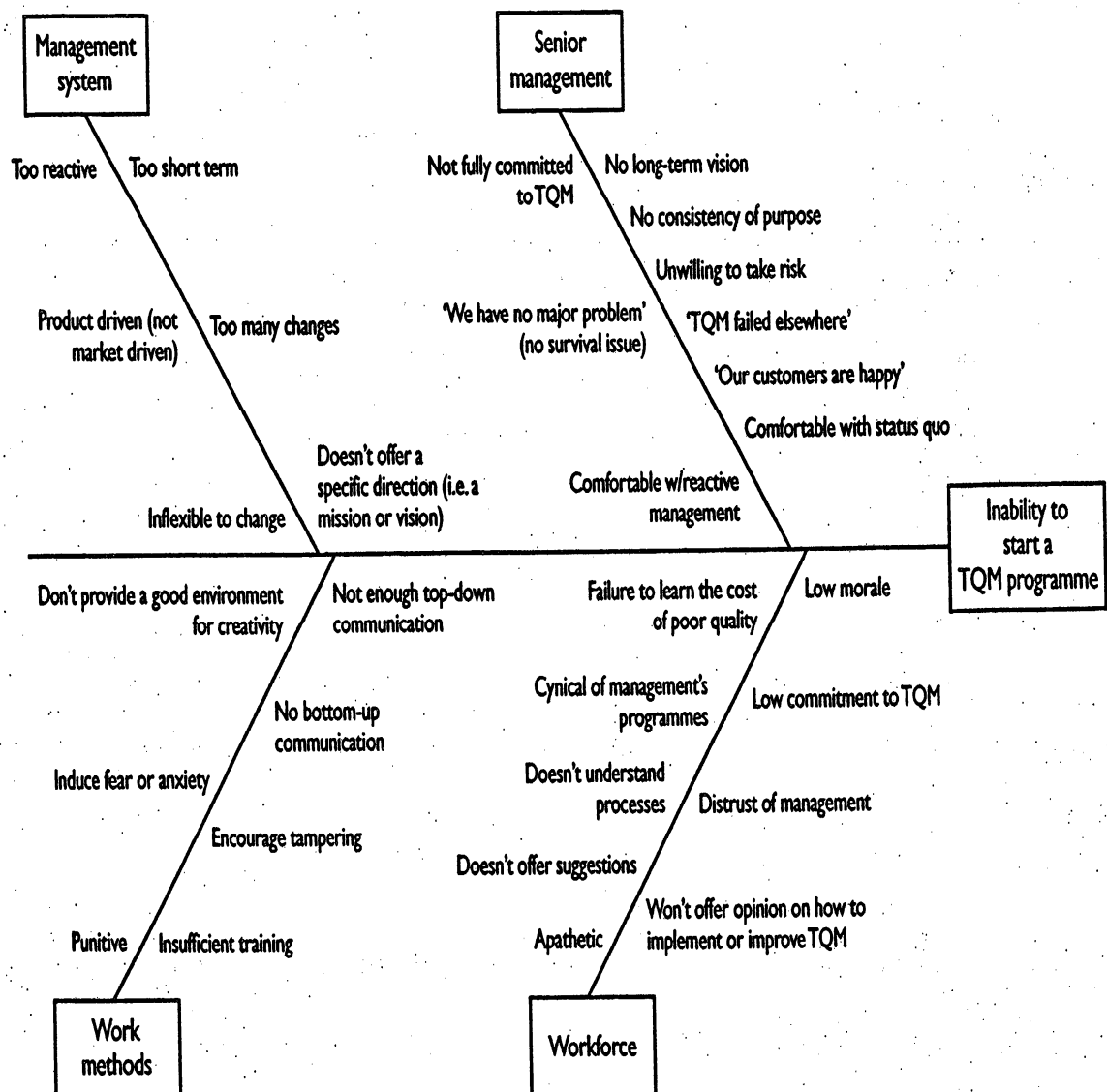
Etc.

Evaluate

Evaluate



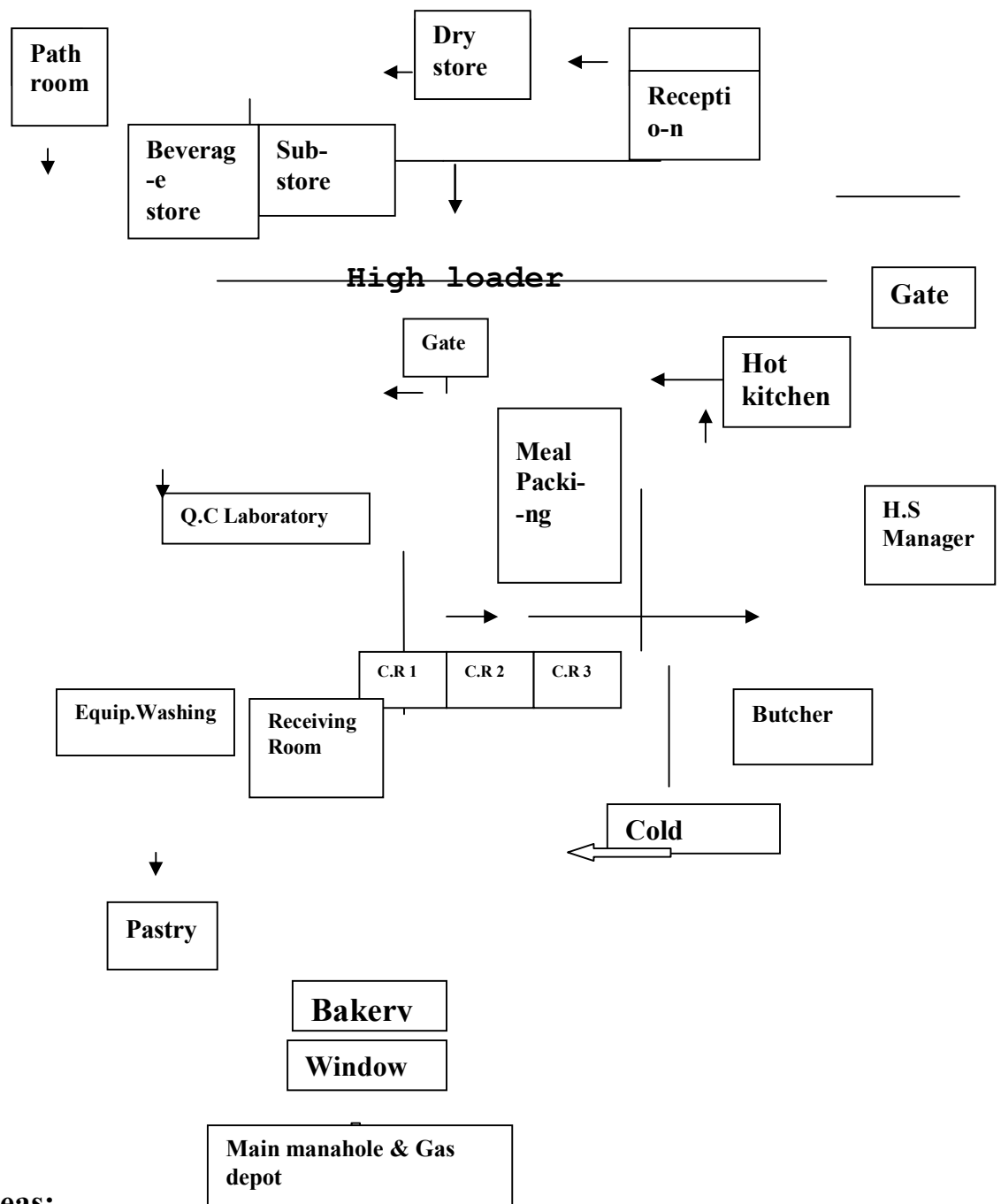
**Diagram (2.7) demonstrate the obstacles likely to occur at implementing T.Q.M**



**Diagram (2.8)**

## The Catering Layout

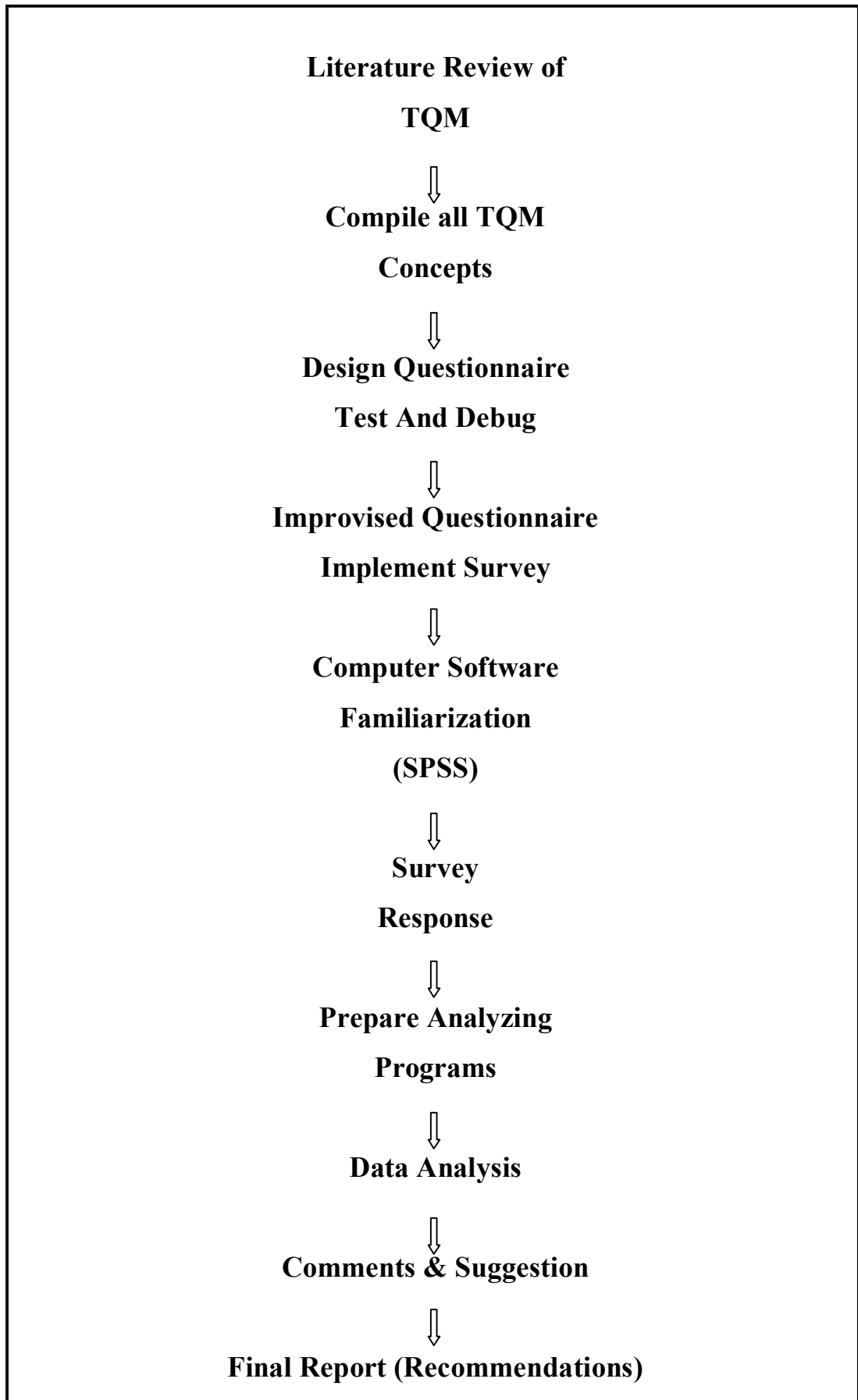
### Tarmak



**Whereas:**

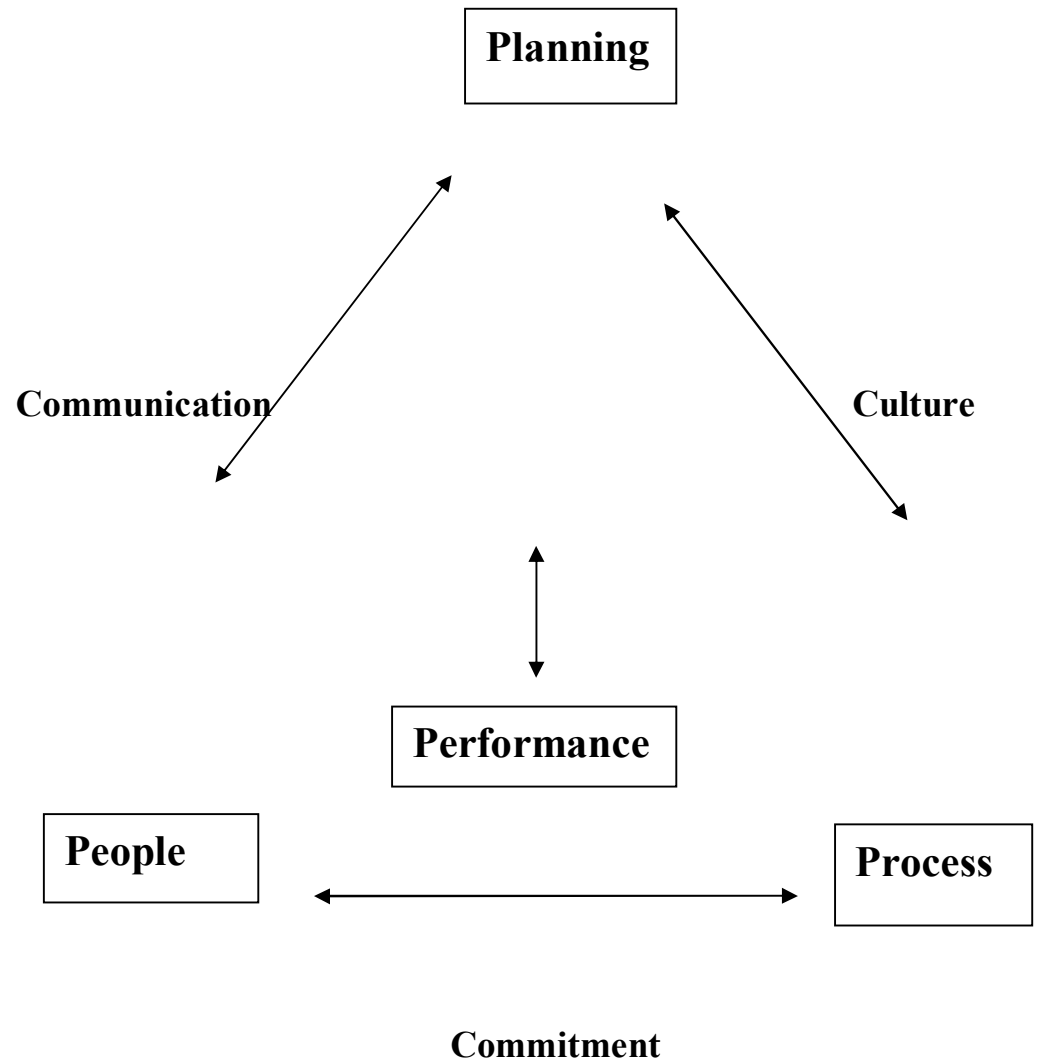
**C.R.1, 2 and 3 = Cold rooms 1 , 2 and 3.**

**Diagram (2.9) Flow chart of Research Procedures**



**Diagram (2.10)**

**The New Model of Total Quality Management (T.Q.M)**



## LIST OF TABLES

**Table (1)**

**Table (1) Comparisons between Classical Management and T.Q.M  
(Characteristic Classical Management and T.Q.M)**

<i>Characteristic</i>	<b>Classical Management</b>	<b>TQM</b>
Organizational structure.	Hierarchical, bureaucratic, functional.	Flat structure, flexible, Process orientated.
Top management style.	Directive, managers manage and workers do.	Fully committed, lead by example, delegate, Facilitate.
Job designations.	Labor is divided and formalized.	Teamwork, both functional and cross-functional.
Labor management.	Collective bargaining.	Individual contracts.
Trade union relations.	Formal and regularized.	Marginalized.
Relationship to society,	Ignored.	Included.
Quality.	Defect detection, low level activity,	Defect prevention, high level activity.

Customer.	An entry in the sales ledger.	Internal and external customers, listen to the voice of the customer.
Suppliers.	Adversarial relationships.	Suppliers are partners.
Communication.	Restricted, limited.	Open, increased flow.
Valued management skills.	Negotiation, monitoring.	Facilitation, nurturing.
Personnel function.	Personnel and industrial relations.	Human resource Management.

**Table 2****Principles of quality management system**

	<b>Principles</b>	<b>Description</b>
1	<b>Customer focus</b>	Organizations depend on their customers and therefore should understand current and future customer needs, should meet customer requirements and strive to exceed customer expectations
2	<b>Leadership</b>	Leaders establish unity of purpose and direction of the organization. They should create and maintain the internal environment in which people can become fully involved in achieving the organization's objectives.
3	<b>Involvement of people</b>	People at all levels are the essence of an organization and their full involvement enables their abilities to be used for the organization's benefit.
4	<b>Process approach</b>	A desired result is achieved more efficiently when activities and related resources are managed as a process.
5	<b>System approach to management</b>	Identifying, understanding and managing interrelated processes as a system contributes to the organization's effectiveness and efficiency in achieving its objectives.
6	<b>Continual improvement</b>	Continual improvement of the organization's overall performance Should be a permanent objective of the organization.
	<b>Principles</b>	Description
7	<b>Factual approach to</b>	Effective decisions are based on the analysis of data and information
8	<b>Mutually beneficial supplier relationships</b>	An organization and its suppliers are interdependent and a mutually beneficial relationship enhances the ability of both to create value



### Tables (3)

The following tables illustrated the food items type, content, daily order and stock order:

#### a. Hot Kitchen Products

Food Items	Ingredients	Daily Order (Small amount)	Stock Order(Large amount)
1. Kufta	1. Minced meat. 2. Species. 3. Rice. 4. Tomato paste.	1. Minced meat. 2. Species	1. Oil. 2. Tomato paste. 3. Rice.
Fried potato	Potato.  Salt.  Edible Oil.	Potato.	Edible Oil.

#### b. Pastry products

Food Items	Ingredients	Daily Order (Small amount)	Stock Order(Large amount)
Pasta	Glash.  Sugar.  Margarine.	Glash.	Sugar.
Passima.	Flour.  Powder milk.  Sugar.  Margarine.  Vanilla flavor.	Vanilla flavor.	Flour.  Sugar.

**c. Breads**

<b>Food Items</b>	<b>Ingredients</b>	<b>Daily Order</b>	<b>Stock Order</b>
1. Roll breads.	1. Flour. 2. Sugar. 3. Instant Yeast. 4. Oil. 5. Salt. 6. Improver.	1. Instant Yeast. 2. Salt. 3. Improver.	1. Flour. 2. Oil. 3. Sugar.

**Tables (4)**

<b>Standard</b>	<b>Scope</b>
ISO 9000:2005	Quality management systems – Fundamentals and vocabulary
ISO 9001:2008	Quality management systems – Requirements
ISO 9001:2008/Cor. 1:2009	
ISO 9004:2009	Managing for the sustained success of an organization -- A quality management approach
ISO 10001:2007	Quality management – Customer satisfaction – Guidelines for codes of
ISO 10002:2004	Quality management – Customer satisfaction –Guidelines for complaints handling in organizations.
ISO 10002:2004/Cor. 1:2009	
ISO 10003:2007	Quality management – Customer satisfaction –Guidelines
ISO/TS 10004:2010	Quality management -- Customer satisfaction -- Guidelines for monitoring and measuring.
ISO 10005:2005	Quality management – Guidelines for quality plans
ISO 10006:2003	Quality management – Guidelines for quality
ISO 10007:2003	Quality management – Guidelines for configuration
ISO 10012:2003	Measurement management systems – Requirements for
ISO/TR 10013:2001	Guidelines for quality management system documentation
ISO 10014:2006	Quality management – Guidelines for realizing financial and economic benefits.
ISO 10014:2006/Cor.	
ISO 10015:1999	Quality management – Guidelines for training
ISO/TR 10017:2003	Guidance on statistical techniques for ISO 9001:2000
ISO 10019:2005	Guidelines for the selection of quality management system consultants.

ISO/TS 16949:2009	Quality management systems -- Particular requirements for the application of ISO 9001:2008 for automotive
ISO 19011:2011	Guidelines for auditing management systems.
Note : TR – Technical Report, TS – Technical Specification	

بسم الله الرحمن الرحيم  
جامعة السودان للعلوم و التكنولوجيا  
كلية الدراسات العليا  
عمادة دراسات الجودة الشاملة  
إستمارة إستبيان  
السلام عليكم ورحمة الله وبركاته .....

يسعى الباحث خلال هذه الدراسة الى التعرف على واقع مدى تطبيق إدارة الجودة الشاملة وفرص التحسين الممكنة فى رفع كفاءة الأداء بقسم التموين / إدارة المناولة الارضيه بشركة الخطوط الجوية السودانية.  
وانى أرجو مساعدتى وكلى امل إن التعاون المعهود بكم من خلال الاجابه على الأسئلة الوارده فى هذه الإستمارة.  
إن تقديمكم للمعلومات الكافيه و المطلوبه بدقه وموضوعيه سيؤدى بلا شك لتقييم أفضل لموضوع الدراسة ومن ثم تحقيق اهدافها وذلك للخروج بتوصيات لوضع الحلول المناسبه.  
وأعدكم أن تتعامل إجابتم بسريه تامه ولا تستخدم إلا لأغراض هذا البحث الخاص بنيل درجة الماجستير فى إدارة الجودة الشاملة والتميز.

واشكركم على حسن تعاونكم ؟؟؟؟؟؟؟

الباحثه / منى سعيد عبد الله

ملحوظه: غير مطلوب ذكر إسم أو وظيفه أو أى بيانات أخرى لمستخدم الإستبيان

## Customer Satisfaction Survey

### First: Personal Data:

#### 1. The gender:

Male ☐ Female ☐

#### 2. The Age:

Less than 30 ☐  
30 — 40 ☐  
40 — 50 ☐  
50 — 60 ☐  
Above 60..... ☐

#### 3. Second: Academic Qualification:

Secondary School ☐  
Post Secondary-Diploma ☐  
University Level ☐  
Post University Level ☐

#### 4. Third: Occupation:

Student ☐  
Technical ☐  
Occupation ☐  
Business Man ☐  
Others ☐

## How Are We Doing:

We are committed to monitoring the quality of the services and products we provide, as part of an ongoing improvement process. We would appreciate your feedback on our performance.

i. Please rate the following aspects of our work (The Company carrier and the cabin crew (the hosts)).

	Unacceptable	Poor	Adequate	Good	Excellent
a. The hosts understanding the business requirements of hospitality.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Communicating clearly and effectively.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Keeping you informed of progress in quality of Product and service.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Responding promptly to your requests	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. The flights meeting timescales (Departure and Arrival).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overall, how do you rate the quality of the products and services that we provide?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Overall, what do you think is the rate of our performance?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

1. Please, if you have any comments/suggestions regarding how we could improve our services, would you tell us using the following box?



## المحكمين

١. د. عوضيه محمد الحسن مركز دراسات الجودة الشاملة والامتياز.

٢. أ.د زين العابدين البشــــــــــــــــير (جامعة النيلين) .... محكم الأستبيان من منظور الـــــــــــــــــ  
SPSS.

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