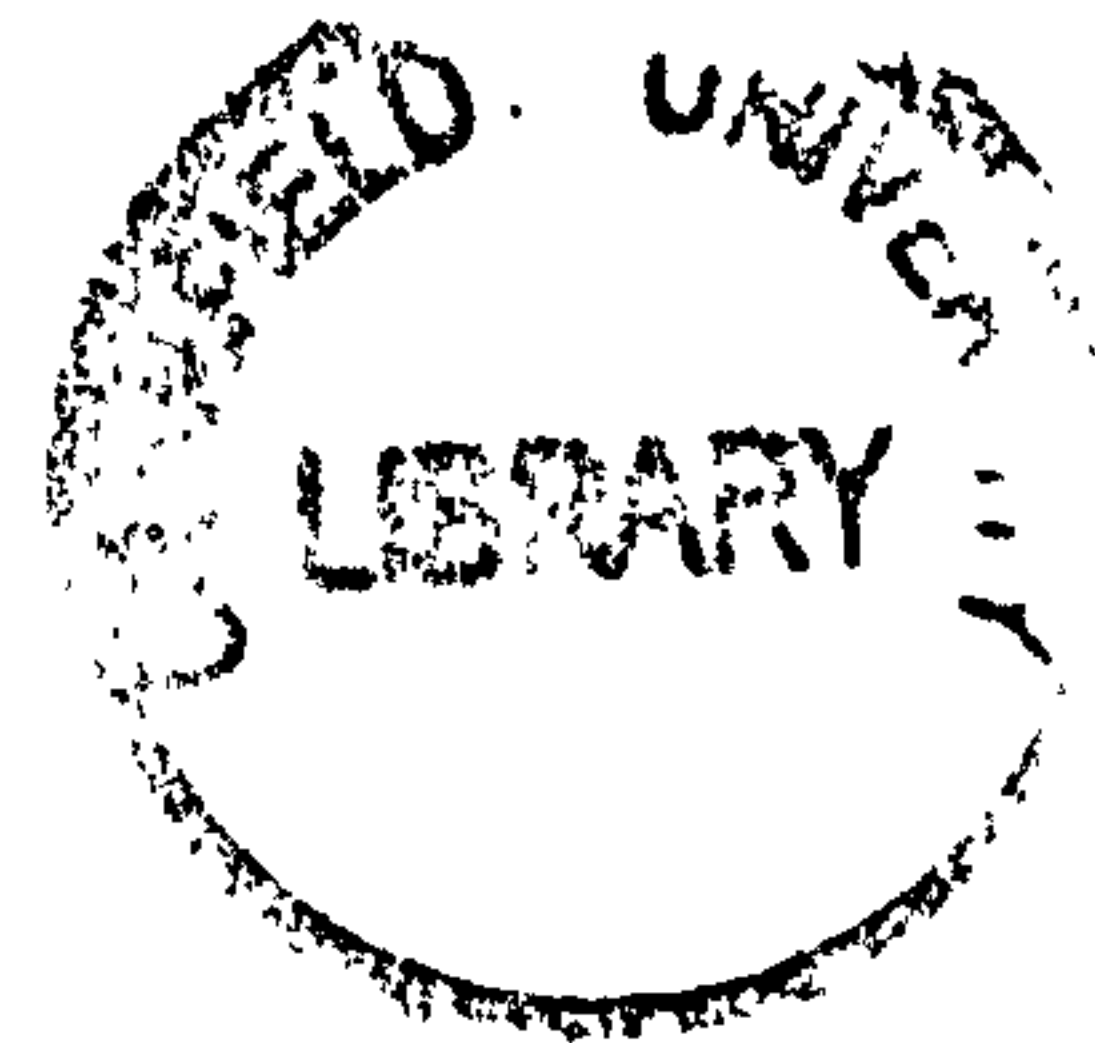


CRANFIELD UNIVERSITY

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**DEFINITIONS OF GUIDELINES FOR INTRODUCING
AN INTEGRATED MANAGEMENT SYSTEM TO
SMALL AND MEDIUM SIZED ENTERPRISES**

SCHOOL OF INDUSTRIAL AND MANUFACTURING SCIENCE

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**Definitions of Guidelines for Introducing an Integrated
Management System to Small and Medium Sized
Enterprises**

Supervisor: Professor J. H. Rogerson

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the degree of Doctor of Philosophy**

ABSTRACT

To survive and achieve to develop their activities in an increasingly competitive environment, small and medium sized enterprises have to increase their competitiveness and, progressively, reduce their operational cost. It is therefore the objective of this research project to develop a flexible and unique management system for these enterprises to use to integrate all management systems or activities related to quality, safety and environmental issues and continuously improve their overall business performance and also to get prepared for certification according to the relevant international standards.

The research project has been based on the edition of 2000 of the ISO 9001 standard: "Quality Management Systems – Requirements", the ISO 14001:1996 standard: "Environmental Management Systems – Specification with Guidance for Use", the BS 8800:1996 standard: "Guide to Occupational Health and Safety Management Systems" and the Business Excellence Model.

The thesis author carried out a data collection procedure to determine the special characteristics of small and medium sized enterprises and to specify their needs for survival and development. The results of the research reinforced the conclusions of the relevant literature that was reviewed. The areas of literature examined related to quality management systems as platforms for integration, to safety and environmental management systems and to business process analysis and the conclusions were taken under consideration from a point of view of small and medium sized enterprises.

The output of the research project is a practical guide for small and medium sized enterprises. It is a route-map of activities for the implementation of the integrated management system, incorporating tools addressing specific management areas using quality, safety and environmental issues to focus them. The route-map has the potential to integrate the overall management activities of an organization and has an internal metric mechanism to indicate the rate of integration. The tools of the route-map were partially implemented to two (2) SMEs, giving positive validation of the concepts.

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CONTENTS

	page
Abstract	i
Acknowledgements	ii
List of Figures	vi
List of Tables	vii
Notation	viii
CHAPTER 0: INTRODUCTION	1
0.1 Objectives of the Thesis	2
0.2 Description of the Objectives of the Research Project	3
0.3 Initial Definitions	8
0.4 Presentation of the Thesis Structure	11
CHAPTER 1: PHASES AND METHODOLOGY OF THE RESEARCH PROJECT	14
1.1 Phase A – Literature review	15
1.1.1 Scope	15
1.1.2 Review Procedure	16
1.2 Phase B – Data Collection	17
1.2.1 Data Source Selection	17
1.2.2 Design of Data Collection Procedure	18
1.2.3 Description of data Collection Tools	20
1.3 Phase C – Standards, Models and Other Regulatory Documentation	22
1.3.1 Selection of Documentation	22
1.3.2 Review Procedure	22
1.4 Phase D – Results Processing and IMS Route-Map Development	24
1.4.1 Steps of the IMS Route-Map Development Procedure	24
1.4.2 IMS Route-Map Tools Development	24
CHAPTER 2: PRESENTATION OF THE RESEARCH PROJECT RESULTS	27
2.1 The SMEs Special Characteristics and Needs	28
2.1.1 General	28
2.1.2 Size Advantages and Disadvantages	28
2.1.3 Management Style and Culture Observations	32
2.1.4 Organizational Characteristics	36
2.1.5 Human Resources Parameters	37
2.1.6 SMEs Needs for Survival and Development	39

	page
2.2 Analysis of IMS Parameters: Quality, Safety, Environmental Management	42
2.2.1 General	42
2.2.2 Quality Management as a Platform for Integration	42
2.2.3 Safety Management	53
2.2.4 Environmental Management	68
2.2.5 Integrated Basis of Quality, Safety and Environmental Management Standards	82
2.3 The Business Excellence Model Approach	85
2.3.1 Brief Review of the Business Excellence Model	85
2.3.2 Brief Review of the Self Assessment Alternative Approaches	91
2.4 Business Process Analysis Principles and Techniques	93
CHAPTER 3: PRESENTATION OF THE IMS ROUTE-MAP FOR SMEs	103
3.1 Detailed Description of the IMS route-Map	104
3.2 Particular Tools of the IMS Route-Map	115
3.2.1 Marketing Integration (MI)	115
3.2.2 Quality, Safety, Environmental Functions of Processes and Locations (QSE)	119
3.2.2 IMS Logistics Parameters (L)	122
3.2.4 Internal Complaints Review System (IC)	126
3.2.5 Internal System of Continuous Assessment Monitoring (ISCAM)	129
3.2.6 Potential Independence of the IMS Route-Map Particular Tools	135
3.3 Applicability of the IMS Route-Map	136
CHAPTER 4: BENEFITS FOR SMEs FROM THE IMS ROUTE-MAP IMPLEMENTATION	144
CHAPTER 5: CONCLUSIONS	148
5.1 Overall Conclusions of the Research Project	149
5.2 Evaluation of the Research Project	151
5.3 Proposals for Further Research	152
BIBLIOGRAPHY	153
APPENDIX A: Interview Checklists	161
APPENDIX B: Data Collection Results Sheets	167

	page
APPENDIX C: Partial Implementation of the Particular Tools of the IMS Route-Map	214
C.1 Implementation of the Particular Tools of the IMS Route-Map in SME A	215
C.1.1 Implementation of the MI Tool	215
C.1.2 Implementation of the QSE Tool	220
C.1.3 Implementation of the L Tool	224
C.1.4 Implementation of the IC Tool	226
C.1.5 Implementation of the ISCAM Tool	228
C.2 Implementation of the Particular Tools of the IMS Route-Map in SME C	232
C.2.1 Implementation of the MI Tool	232
C.2.2 Implementation of the QSE Tool	234

LIST OF FIGURES

	page
Figure 1/0: Presentation of the Thesis Structure Flowchart	13
Figure 1/2: The Selling and Marketing Concepts Contrasted	97
Figure 2/2: ISO / CD1 9001:2000 - The Quality Management Process Model	98
Figure 3/2: BS 8800:1996 - Elements of successful Health and Safety Management based on the approach of ISO 14001:1996	99
Figure 4/2: ISO 14001:1996 - Environmental Management System Model	100
Figure 5/2: A model for the integrated structural basis of Quality, Safety and Environmental Management Standards (ISO 9001:2000 - BS 8800:1996 - ISO 14001:1996)	101
Figure 6/2: The Business Excellence Model	102
Figure 1/3: The IMS Route-Map for SMEs	137
Figure 2/3: Marketing Integration (MI)	138
Figure 3/3: Quality, Safety and Environmental Functions of Processes and Locations (QSE)	139
Figure 4/3: Presentation of the Relative Significance (%) Of IMS Elements for Processes and Locations through Histograms	140
Figure 5/3: Internal Complaints Review System (IC)	141
Figure 6/3: Internal System of Continuous Assessment Monitoring (ISCAM)	142
Figure 1/C: SME A - Customer Complains - 1998 (Pareto Analysis)	238
Figure 2/C: Presentation of the Relative Significance (%) Of IMS Elements for selected Processes and Locations of SME A through Histograms	239
Figure 3/C: Presentation of the Relative Significance (%) Of IMS Elements for selected Processes and Locations of SME A through Histograms	240
Figure 4/C: Daily ISCAM Data Sheet for Top Management of SME A	241

LIST OF TABLES

	page
Table 1/1: SMEs included in the Data Collection Procedure	26
Table 1/3: A Risk Level Estimator	143

NOTATION

BS:	British Standard
EFQM:	European Foundation of Quality Management
EMAS:	Eco-Management and Audit Scheme
IMS:	Integrated Management System
ISO:	International Standard Organization
IC:	The «Internal Complaints Review System» tool
ISCAM:	The «Internal System of Continuous Assessment Monitoring» tool
L:	The «IMS Logistics Parameters» tool
MI:	The «Marketing Integration» tool
QSE:	The «Quality, Safety, Environmental Functions of Processes and Locations» tool
SMEs:	Small and Medium Sized Enterprises

CHAPTER 0: INTRODUCTION

Chapter 0: Introduction is the initial chapter of the thesis and outlines the overall framework within which the research project was developed. More specifically, this chapter aims at:

- presenting the objectives of the thesis
- describing the objectives and phases of the research project
- determining the definitions of key concepts of the research project
- presenting the structure of the thesis

Chapter 0 consists of four (4) paragraphs.

0.1 Objectives of the Thesis

This thesis has been written up as a result of the Ph.D. Research Project titled “Definitions of Guidelines for Introducing an Integrated Management System (IMS) to Small and Medium Sized Enterprises (SMEs)”, which was carried out at Cranfield University, School of Industrial and Manufacturing Science, Quality and Process Improvement Department.

The objectives of the thesis are:

- to describe the methodology applied in all different phases of the research project
- to present the results and conclusions of the relevant literature review
- to present the results and conclusions of the relevant management system standards, models and other regulatory documentation review
- to present the results of the data collection procedure, in relation to the concepts and parameters that determine the aims and content of the research project
- to present the final “product” that was developed by the research project, its applicability and its value and
- to summarize all conclusions of the research project.

The structure of the thesis is presented and explained in paragraph 0.4.

0.2 Description and Objectives of the Research Project

The PhD Research Project titled “Definitions of Guidelines for Introducing an Integrated Management System (IMS) to Small and Medium Sized Enterprises (SMEs)” aims at developing a flexible, route-map structured management system for SMEs to use to integrate all management systems or activities relating to Quality, Safety and Environmental issues and improve their overall performance and competitiveness.

SMEs are and will be a significant task to work on within the framework of the European Union economy. The global trend indicates that today and in the near future big firms will be united to giant enterprises, which will dominate the market, influencing all its parameters and determining prices. Due to these reasons, SMEs will face many perils and run the risk of being excluded from the marketplace, if they do not manage issues like cost reduction and competitiveness immediately and in the most efficient way.

The European Union’s concern about enabling SMEs to survive in a rather difficult business environment is very obvious. It is important to mention that:

- In the 1996 British Quality Foundation & EFQM edition of the Business Excellence Model and the process of Self Assessment, special guidance for Small Businesses is provided for first time.
- The Regulation (EEC) 1836/93 for Eco-Management and Audit Scheme (EMAS) gives emphasis to the way that it can be implemented to SMEs.
- Most of the Research Programs funded by the European Union provide opportunities for projects that deal with SMEs development and their performance improvement (e.g. 5th Framework Program stresses the necessity of taking notice of SMEs special requirements).

Additionally, management system standards like the ISO 14004:1996 “Environmental Management Systems – General Guidelines on Principles, Systems and Supporting Techniques” and the BS 8800:1996 “Guide to Occupational Health and Safety Management Systems” make special reference to their applicability to SMEs.

Quality, safety and environmental issues reflect all aspects of competitiveness. More precisely:

- the concept of Quality Management, as a means to achieve benefits for all stakeholders groups through sustained customer satisfaction (ISO/CD 9001:2000 “Quality Management Systems – Guidelines”, ISO/TC 176/ SC 2/N 415),
- Safety, as a management field for controlling and reducing all kinds of losses and the relevant cost

- Environment, as a synthesis of internal and external parameters to be managed for the benefit of both the organization and the society

create, in synergy, a triangle basis for developing a management system that SMEs need and are able to implement and which can be extended to serve the overall management needs of these enterprises.

The objectives of this research project are outlined below.

1. DEVELOPMENT OF AN INNOVATIVE UNIQUE GENERIC SYSTEM FOR MANAGING QUALITY, SAFETY AND ENVIRONMENTAL ISSUES

By examining the special characteristics and needs of SMEs, among which the necessity for cost-effective management systems and procedures and the limited resources are the most critical ones, the importance of establishing and using management systems that unify a number of issues in these organizations becomes very obvious.

Although a number of articles have addressed the IMS approach for quality, safety and environmental issues, no generic management basis has been established yet for SMEs. Standards, models and regulatory documentation demonstrate a structural relationship between the management methodologies of these three (3) issues but there is a big difference between their objectives and orientation as they appear to be put in practice at the moment:

- Quality management basically aims at satisfying customer expectations and needs
- Safety management primarily aims at fulfilling legal obligations
- Environmental management aims at proving the existence of a social responsibility.

By integrating these issues through the development of a **unique management system** and a **common framework of objectives**, a significant aid is provided for SMEs to achieve competitiveness and continuous improvement targets. The eight (8) quality management principles as they are presented in ISO/CD1 9004:2000 “ Quality Management Systems – Guidelines” (ISO/TC 176/SC 2/N 415):

- ⇒ Customer focused organization
- ⇒ Leadership
- ⇒ Involvement of people
- ⇒ Process approach
- ⇒ Systems approach to management
- ⇒ Factual approach to decision making
- ⇒ Continual improvement
- ⇒ Mutually beneficial supplier relationships,

will constitute the conceptual background for this integration.

The IMS will be developed in such a way to dynamically evolve for achieving the overall management system integration in SMEs.

2. PREPARATION OF SMEs FOR ISO 9000 AND ISO 14000 CERTIFICATION

The IMS route-map will be designed and developed in consistency with ISO/CD 9001:2000 (ISO/TC 176/SC 2/N 415)“Quality Management Systems - Requirements”, which is going to be referred in the thesis as the “ISO 9001:2000 standard”, and ISO 14001:1996 “Environmental Management Systems: Specification with Guidance for Use”. The implementation of the route-map will be a simultaneous preparation of SMEs for being certified according to the standards mentioned before.

ISO 9001 and ISO 14001 certification is very important to SMEs for various reasons:

- It provides strong marketing tools to these companies that really need them
- It increases their products or services reliability
- It creates a sound background for culture change
- It produces “ formal paths” of communication to SMEs where the high rate of informality could cause problems
- It gives SMEs the opportunity to become suppliers of bigger organizations which consider such certification as a requirement for starting a collaboration with a supplier
- It upgrades their image to all groups of stakeholders.

3. INCREASE OF SMEs ORGANIZATIONAL FLEXIBILITY

An advantage of SMEs is that their size helps them maintain their flexibility. Apart from that, the organizational structure is a critical parameter for an organization’s flexibility.

By integrating management systems eventually a lean-structured cross-functional process-oriented organization is gradually formed. Fewer horizontal functions substitute separate vertical ones and fewer people are needed while more activities are accomplished. The IMS route-map implementation should lead SMEs to create more flexible organizational structures and increase their efficiency.

4. REDUCTION OF SMEs OPERATIONAL COST

Quality, safety and environmental management systems provide cost reduction benefits to companies, through:

- minimization of cost of non – conformity
- improvement of productivity
- continuous reduction of losses and of the relevant cost
- improvement of process management
- implementation of preventive actions instead of corrective actions

The synergy achieved by integrating these management systems will multiply the benefits mentioned above. The IMS route-map will additionally help SMEs control their overall operational activities more effectively and efficiently through specific tools.

5. ESTABLISHMENT OF MECHANISMS FOR SMEs CONTINUOUS ASSESSMENT OF PERFORMANCE IMPROVEMENT

Based on the eight (8) quality management principles and the principles of Business Excellence Model, the IMS route-map introduces ideas and techniques of continuous improvement assessment that suit SMEs.

It must be mentioned that SMEs needs for performance assessment are different from these of big enterprises; for SMEs, parameters like time and response speed are much more critical, as their time horizons are inevitably shorter and their financial and other resources are limited. Their assessment system must continuously monitor their overall performance, giving them the possibility to take immediate action as soon as problems or system deficiencies occur.

6. INCREASE OF SMEs COMPETITIVENESS

The combination of organizational flexibility, operational cost reduction and continuous total performance improvement assessment will increase SMEs competitiveness dramatically.

An IMS route-map can act as a platform for the development of a new management style that will be based on:

- simplified purposeful procedures
- value-adding process planning
- front-line management practices

The phases of the research project are as follows.

Phase A - Literature Review

In this phase, a detailed review of literature relevant to SMEs and to quality, safety and environmental management was made. Additionally, literature relevant to Business Process Analysis principles and techniques was reviewed, since the IMS route-map is process-oriented, in consistency with ISO 9001:2000, BS 8800:1996 and ISO 14001:1996.

Phase B - Data Collection

Data was collected by the following sources:

- Top management representatives of thirteen (13) SMEs
- Eight (8) consultants specialized in the area of quality management

- Assessors of three (3) Certification Bodies

The data collection procedure was based on designed interviews that were carried out by the thesis author during arranged meetings with the interviewees. It must be mentioned that additional data has been collected during the researcher's working experience as a Quality Management Consultant and as a Quality Director to an SME (see 1.2.2).

Phase C - Standards, Models and Other Regulatory Documentation Review

During this phase, a common basis was created to satisfy the requirements of:

- ISO 9001:2000
- ISO 14001:1996
- BS 8800:1996

and to converge with the concepts and the criteria of:

- The Business Excellence Model (1998 British Quality Foundation & EFQM edition),

to develop the IMS route-map in consistency with them. The ISO 9004:2000 and ISO 14004:1996 standards were taken under consideration. The Regulation (EEC) 1836/93 for Eco-Management and Audit Scheme (EMAS) was also studied as a regulatory document strongly related to the content of the IMS route-map.

Phase D - Results Processing and IMS Route-Map Development

In this phase the results of the activities of the above phases were processed and the IMS route-map was developed. More specifically:

- Implementation phases and milestones were defined.
- IMS route-map tools were presented and explained.
- The applicability of IMS route-map and the time schedule of its implementation were examined
- The benefits for SMEs from the IMS route-map implementation were outlined

During this phase, a partial implementation of the IMS route-map tools took place in two (2) SMEs, as a pilot for the evaluation of their applicability. The results of this partial implementation are presented in Appendix C.

The research project is reported in terms of four (4) main themes:

- Methodology of the activities of Phases A, B, C and D (*Chapter 1*)
- Results of the activities of Phases A, B and C (*Chapter 2*)
- Results of the activities of Phase D – Presentation and description of the IMS route-map and its benefits to SMEs (*Chapters 3, 4*)
- Conclusions, including proposals for further research (*Chapter 5*).

0.3 Initial Definitions

For the purposes of the thesis, a determination of a number of initial definitions is considered to be useful. These definitions address to the key concepts of the research project that have affected all of its phases and its results.

A. Quality, Safety and Environment

For the three (3) key concepts of the IMS route-map, quality, safety and environment, the definitions given respectively in clauses 2.1, 2.8 of ISO 8402:1994 “Quality Management and Quality Assurance - Vocabulary” and clause 3.2 of ISO 14001:1996 are going to be used:

Quality - Totality of characteristics of an entity that bear on its ability to satisfy stated and implied needs.

Safety - State in which the risk of harm (to persons) or damage is limited to an acceptable level.

Environment - Surroundings in which an organization operates, including air, water, land, natural resources, flora, fauna, humans and their interrelations.

B. Small and Medium Sized Enterprises

During the decades, many statements of different points of view have been set to define what an SME is. More specifically:

1. SMEs Definition of the Committee for Economic Development (1947), cited by Hollingsworth and Hand (1979) (Fang [1])

SMEs must have a minimum of two of the following characteristics:

- a) Management is independent and most often the managers are the owners.
- b) Equity capital is supplied by an individual or a small group.
- c) The operations are essentially local.
- d) Business is small compared to the largest competitors.

2. SMEs Definition of Wiltshire Committee (1971) p7, cited by Watson and Everett (1993) (Fang [1])

A business in which one or two persons are required to make all the critical management decisions: finance, accounting, personnel, purchasing, processing or servicing, marketing, selling, without the aid of internal specialists and with specific knowledge in one or two functional areas.

3. European Commission's Definitions for SMEs (extracted from the COBRA Methodology Manual [2])

- **“Medium Sized Enterprises”**

A Medium Sized Enterprise has got the following characteristics:

- ⇒ 50 - 250 employees
- ⇒ annual turnover below 40m ECU
- ⇒ balance sheet total up to 27m ECU

- **“Small Enterprises”**

A Small Enterprise has got the following characteristics:

- ⇒ fewer than 50 employees
- ⇒ annual turnover below 7m ECU
- ⇒ balance sheet total up to 5m ECU

- **“Very Small Enterprises”**

A Very Small Enterprise has got fewer than 10 employees.

In all the above cases, not more than 25 % of an SME must be owned by one or more large enterprises.

4. SMEs Definition of ISO/TC 176 Sub-committee SC2, Quality Systems (1996) (Fang [1])

An SME is not a matter of the number of employees, but rather a philosophy of the way the business is run. An SME is usually managed by a very small number of people. The single owner, two or three people in partnership, a company with three or four executives are typical examples.

ISO/TC 176 Sub-committee SC2, Quality Systems definition (4) is considered to be closer to the aims and content of the research project, because:

- the phrase “a philosophy of the way the business is run” reflects a common reality of the management situation of all SMEs, analyzed by the data collection procedure of the research project
- this definition is based on qualitative criteria related to the management practices of these organization, a fact that is critical for the research project.

European Commission's definition (3) is based on absolutely quantitative criteria that do not fully suit the purposes of the research project, because they do not take under consideration issues related to the organizational structure of these enterprises which strongly influence the content of the research project.

Wiltshire Committee's definition (2) is focused on the facts that human resources are limited and there is a lack of expertise in SMEs, facts that are included in ISO/TC 176 Sub-committee SC2, Quality Systems definition (4).

The Committee for Economic Development definition (1) includes mostly quantitative criteria, like the number of equity capital suppliers and the business size. The reference to the fact that in SMEs usually management is carried out by the owners is accurate and this fact was proved by the results of the data collection procedure of the research project.

C. Process

The definition given in **clause 1.2 of ISO 8402:1994 - Quality Management and Quality Assurance / Vocabulary** is: “A set of inter-related resources (including personnel, facilities, equipment, techniques and methods) and activities which transform inputs into outputs”.

The concept of transformation is also adopted by **Johansson *et al*** [3] for the definition of the word **process**, according to which, the transformation that occurs in a process should add value to input and create output that is more useful and effective to the recipient either upstream or downstream.

The above definition interprets process as a workflow, a series of activities aiming at producing something of value. ISO 8402 gives a somewhat different approach, interpreting process as the coordination of work, whereby a set of skills and routines is exploited to create a capability that cannot be easily matched by others.

One more process definition close to the latter approach is that of **Fernando Flores**, given in “**Offering New Principles for a Shifting Business World**”, indicated by **Keen *et al*** [4]: “rather than tracking the flow of materials or data, business process chart the coordination of action between people (and sometimes machines) involved in an activity”.

Obviously, the two interpretations of processes are complementary and the definition that is going to be used is the following: **A process is a workflow that transforms inputs into outputs, appropriately coordinated for being effective and continuously improved.**

0.4 Presentation of the Thesis Structure

Figure 1/0 shows the thesis structure using a flowchart. The main elements of this flowchart are the following:

- ⇒ Chapters 1, 2, 3, 4 and 5 of the thesis are linked through black arrows indicating the reader's sequence between these chapters.
- ⇒ The paragraphs of each Chapter are also linked through black arrows indicating the reader's sequence between them. Especially in Chapter 2, the black arrows between the paragraphs are double-head, indicating that the sequence between them is not strict.
- ⇒ Each of the four (4) paragraphs of Chapter 1, the titles of which describe a phase of the research project and are put in coloured boxes, is linked through arrows of the same colour with the thesis areas where the results relevant to the phase are presented or correlated with. So:
 - The results of Phase A: Literature Review are basically presented in paragraphs 2.1, 2.2 and 2.4 of Chapter 2 (see red arrows).
 - The results of Phase B: Data Collection are fully presented in paragraph 2.1 of Chapter 2 and are correlated with Chapter 3 (see green arrows). Where needed, references are also made in the main paragraph 2.2 of Chapter 2 but this is not extended so it is not indicated by red arrow.
 - The results of Phase C: Standards, Models and Other Regulatory Documentation Review are presented in paragraphs 2.2 and 2.3 of Chapter 2 (see blue arrows).
 - The results of Phase D: Results Processing and IMS Route-map Development are presented in the whole Chapter 2 and are correlated with Chapter 3 (see yellow arrows)

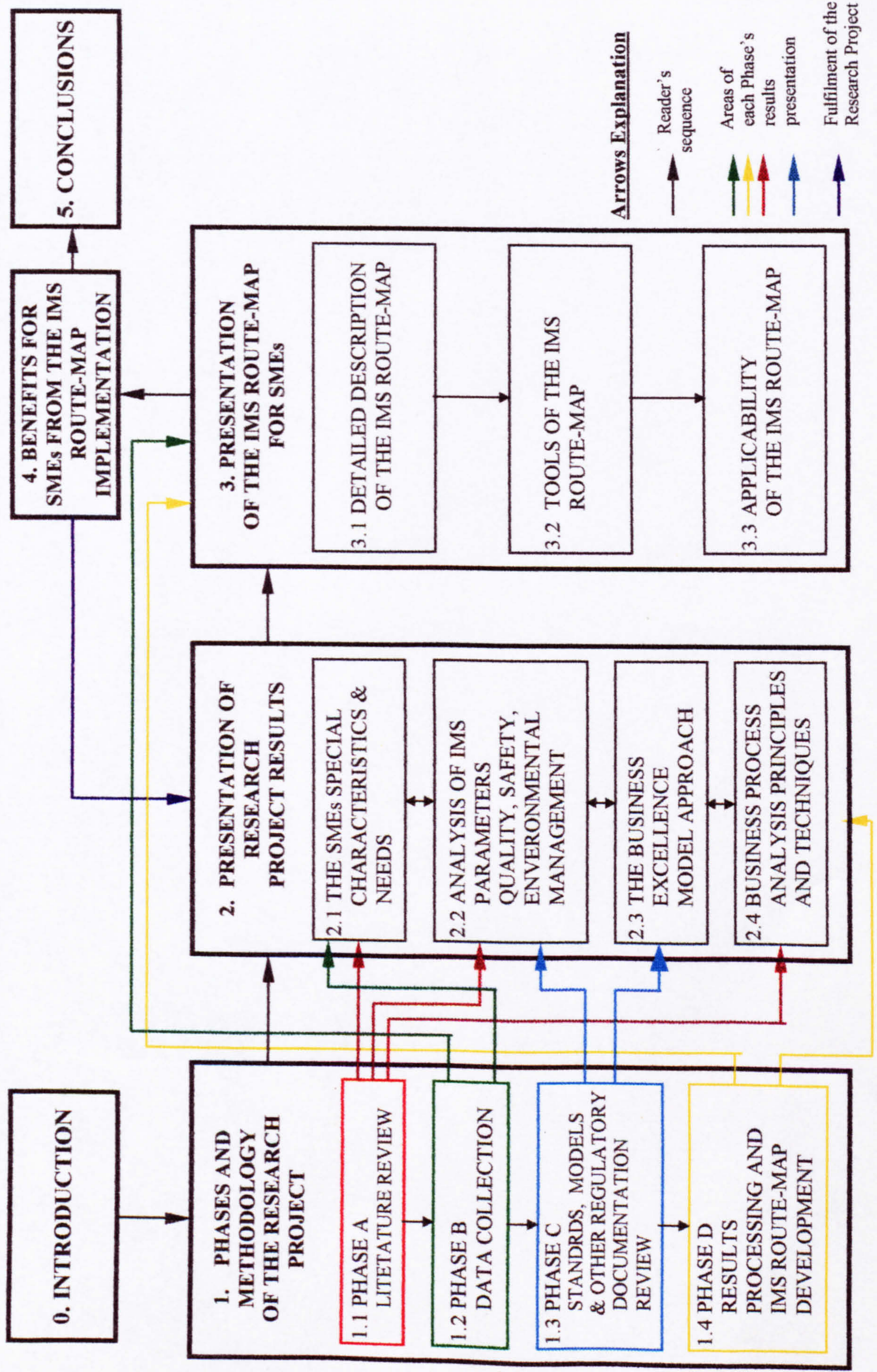
The benefits of this type of presentation lie on the fact that results of each of the research project phases (A, B, C, D) are not analyzed separately but are reflected to the whole extend of the thesis. Actually, when the research project was carried out, the phases had a dynamic sequence and the borders between them were rather loose, as their particular objectives are in full consistency.

⇒ A purple arrow links Chapter 4, where the benefits for SMEs from the implementation of the IMS route-map are analyzed with Chapter 2, where the research project results are presented. This link aims at proving the research project fulfilment, which means:

- The IMS route-map addresses the SMEs special characteristics and satisfies their needs

- The quality, safety and environmental management standards, models and other regulatory documentation requirements can be met by implementing the IMS route-map
- The IMS route-map is in accordance with the Business Excellence Model basic concepts
- The IMS route-map provides guidelines for the implementation of a process oriented management system, incorporating the main principles of Business Process Analysis.

FIGURE 1/0 : Presentation of the Thesis Structure Flowchart



CHAPTER 1: PHASES AND METHODOLOGY OF THE RESEARCH PROJECT

Chapter 1: Phases and Methodology of the Research Project outlines the distinct phases of the research project and the methodology used for each phase to be accomplished. In this chapter, analytical information is given for:

- the scope of literature reviewed and the review procedure
- the data collection procedure
- the way standards, models and other regulatory documentation were selected and reviewed
- the results processing activities in relation to the development of the IMS route-map.

Chapter 1 consists of four (4) paragraphs.

1.1 Phase A - Literature Review

1.1.1 Scope

The phase of literature review aimed at:

- studying systematically the research work that has already been made in the areas of concern
- examining the results of that research work and assessing its conclusions
- forming a framework of concepts, tools and techniques that would comprise a theoretical background for the research.

The scope of literature review covered the areas of SMEs management and development, quality management as the platform for integration, safety management, environmental management and business process analysis. Within the framework of the three (3) management systems literature review, a number of papers referring to attempts for integrating two (2) or all these systems were studied.

More specifically:

SMEs Management and Development

As the IMS route-map addresses the SMEs needs from a system that integrates quality, safety and environmental management activities, literature relevant to:

- special issues related to the management and organization of SMEs
- barriers for SMEs development

was reviewed, for these points reflect the special characteristics and needs of SMEs. The conclusions of other researchers were studied, evaluated and compared with the results of the data collection procedure of this research project. It must be mentioned that the literature relevant to SMEs is mostly focused on giving guidance to new entrepreneurs for setting up an SME and mechanisms for finding out financial resources. The extent of literature relevant to the points mentioned above is limited.

Quality Management

Quality management is considered to be the platform for the management systems integration. A part of the relevant literature reflects this consideration but most of the cases examined seem to adapt standards requirements for preparing a common documentation rather than integrating management systems. It should be noted that the literature relevant to quality management included a number of references that address to the implementation of quality management systems to SMEs.

As the implementation of integrated management systems is a change process for organizations, issues of change management are linked with that.

Safety Management

The area of Safety management from the aspect of literature is correlated to the adoption of a systems approach and to the business benefits that a safety management system can result to. As safety management is basically influenced by the legal requirements and regulations and also by sets of guidelines instead of standards requirements for certification, the relevant literature has the same physiognomy.

Environmental Management

Environmental management literature is mostly focused on how the ISO 14001:1996 standard requirements have been interpreted and adjusted in a management system framework created by the ISO 9000 (1994) standards requirements. A part of the relevant literature refers to the similarities and differences between the requirements of the ISO 14001 and the requirements of the Regulation (EEC) 1836/93 for Eco-Management and Audit Scheme (EMAS). References are also made to the relationship between environmental and quality management and also between environmental management and safety management, aiming at their integration.

Business Process Analysis

For building up the IMS route-map, the business process analysis principles and techniques had to be studied, because the systems integration is based on process integration and process - oriented management approaches, for being in consistency with the relevant standards and models (ISO 9001:2000, ISO 14001:1996, BS 8800:1996 and the Business Excellence Model). In addition to that, the IMS route-map tools are based on cross-functional arrangements that need to take under consideration not only the distinct activities but the flow of activities within processes as well.

1.1.2 Review Procedure

Articles and books were selected mainly from the databases of the Cranfield University Library. A number of articles were also selected from the Library of the Technical Chamber of Greece.

For each area of the literature review scope, every source was studied and all points relevant to the aim and the areas of concern of the research project were highlighted. When the whole material of an area was reviewed, highlighted points were evaluated in an overall estimation process and the ideas, views and concepts that were considered to contribute to the fulfillment of the aim of the research project were extracted.

The presentation of the literature review results was determined in a combination with the results and conclusions of the data collection procedure and the results of the standards, models and other regulatory documentation review.

1.2 Phase B - Data Collection

1.2.1 Data Sources Selection

The field work of the research project included the collection of data necessary for the development of the IMS route-map for SMEs. The aims of the data collection were:

- to carefully examine the SMEs organizational structures, and, if possible, their overall internal environment within which the IMS route-map must be successfully introduced
- to evaluate the circumstances that obtain in SMEs organizational structures and that will determine the structure of the IMS route-map
- to identify the common weaknesses and strengths of SMEs in relation to the quality, safety and environmental management issues
- to contribute to the overall conclusions about the SMEs special characteristics and needs

The sources that were selected for the data collection were of three (3) categories:

- ⇒ SMEs
- ⇒ Consultants specialized in the area of quality management
- ⇒ Assessors of Certification Bodies

Obviously SMEs were selected as a data source, because these organizations are the user group of the IMS route-map.

Thirteen (13) Greek SMEs were selected according to the following criteria:

1. The selected SMEs should be “representative samples” of this category of organizations, according to the definition of SMEs that has been adopted in this research project (see paragraph 0.3).
2. The extent of the thesis author’s involvement in the SMEs, because in cases where this involvement was more extensive, from both the aspects of time and content of the cooperation, more detailed data could be collected and more sound conclusions could be determined.
3. The selected SMEs should cover, if possible, all the four (4) generic categories of developing activities (hardware, software, processed materials and services), for assuring that the conclusions would be universal. (Finally the selected SMEs covered all the generic categories except hardware).

Consultants specialized in the area of quality management, as a data source, can give valuable information because:

- due to their experience gathered from a number of situations, their views and conclusions are reliable and spherical

- having deep knowledge of the area of quality management, they can give valuable data in relation to the way that SMEs interpret and implement the basic principles of it, leading to a number of points that should be taken under consideration in the phase of IMS route-map development, as the quality management will be the platform of integration.

Due to the fact that the thesis author had been employed as a quality consultant in the past, she had access to quality consultants. Eight (8) of these people took part in the data collection procedure. Their experience of SMEs was the criterion for selection.

Assessors of Certification Bodies have also been included in the data sources, because:

- they have experience of the way that organizations (including SMEs) interpret the quality management systems standards (ISO 9000) requirements and take the appropriate action to meet them
- they have the opportunity to identify the quality management systems weaknesses from outside the organization and with an auditing approach, which means that their observations are accurate and clear.

There was some difficulty in accessing Certification Bodies as a researcher and finally the possibility of interviewing assessors of three (3) Certification Bodies was obtained: ELOT, TUV Austria and TUV Sddeutschland. As in Greece there are about seven (7) Certification Bodies in the area of quality management (ISO 9000), the “sample” can be considered as representative.

1.2.2 Description of Data Collection Procedure

The data collection procedure was based on two (2) approaches:

The first was the **interview** approach. Interviews were carried out with individuals from the three (3) categories of data sources (SMEs, quality consultants, Assessors of Certification Bodies). These interviews were based on specific Interview Checklists. A different Interview Checklist for each category of data sources was developed and used.

The reason for developing and using interview checklists instead of questionnaires was that the collection of the data needed would not be facilitated if the individuals were asked questions that should be answered with “yes” or “no”. Interviews should have the flexibility to be tailored to the special issues that every interviewee would refer to, so the interview checklists were developed to be used as a common framework for the interviews and not as a tool for collecting data to be statistically processed. In all interviews, a variety of issues were mentioned and discussed, remaining focused on the content of the interview checklist used, and valuable data was collected. The nature of this data would not have been so “qualitative”, if its collection had been based on questionnaires filled up with ticks in proper boxes.

In cases of SMEs, the interviewees were either the general manager / owner or the quality representative of the organization, as these are the key individuals for giving sound and reliable data in relation to the SMEs organizational issues and the way that SMEs are involved in the area of quality management systems.

The interviews were arranged directly with the interviewees of all categories of data sources through a telephone or a personal contact made by the thesis author who clearly explained the aims of the interview within the framework of the Ph.D. research project. In all cases an access pre-existed.

During each interview, notes were taken and the results are presented in Data Collection Results Sheets (see Appendix B).

The second approach of the data collection procedure refers only to SMEs and is related to the **additional cooperation** that the thesis author had with eight (8) of the thirteen (13) SMEs included in the data collection procedure. The thesis author cooperated with these SMEs in the following ways:

- as a quality management consultant introducing a quality management system according to the ISO 9000 standards
- as a consultant for carrying out feasibility studies related to investments and business plans
- as an employee in the position of Quality Director

During the period that each cooperation took place, the thesis author had the opportunity to examine the characteristics of those organizations in more detail and to collect data from the quality management system introduction procedure, which was very useful for the development of the IMS route-map. The additional data is incorporated in the Data Collection Results Sheets (see Appendix B) and also in the presentation of SMEs special characteristics and needs (see paragraph 2.1).

It must be mentioned that from the SME where the thesis author has been working as a Quality Director since the fall of 1996, data has been collected in a continuous basis and this fact was of critical importance for the IMS route-map development.

Table 1/1 lists the thirteen (13) SMEs included in the data collection procedure. Each one has been coded with a capital letter of the Latin alphabet. In this Table the following issues are clarified for each SME:

- the type of its activity
- whether a quality management system exists or not and, if exists, whether it is ISO 9000 certified or not (because this point determines which parts of the relevant Interview Checklist have been used)
- Details for the data collection procedure - whether it included only formal interview(s) based on the relevant Interview Checklist or included also data collected during additional cooperation of the thesis author with the SME.

1.2.3 Description of Data Collection Tools

The tools of the data collection procedure were the three (3) **Interview Checklists**, each one used for the interviews carried out with individuals of a particular category of data sources:

- Interview Checklist A was used for interviews with SMEs representatives
- Interview Checklist B was used for interviews with consultants specialized in the area of quality management
- Interview Checklist C was used for interviews with Assessors of Certification Bodies

The Interview Checklists A, B and C are presented in Appendix A.

The development of the Interview Checklists was based on the following three (3) steps:

Step 1: Identification of key areas of concern

For data collected from SMEs the key areas of concern included:

- generic data of the organizational structure of SMEs
- data related to the SME's quality management system (if existed) or to the way that the SME deals with quality issues
- data related to the way that the SME deals with safety and environmental issues.

For data collected from quality consultants, the areas of concern included, in general, data related to the difficulties they face when introducing a quality management system to SMEs and to the attitude of these organizations towards such a project.

For data collected from Assessors of Certification Bodies the key areas of concern included:

- data for the relationship between the Certification Body and the SME before the ISO 9000 certification audit, to identify the level of awareness of people in SMEs and the way they initially approach the whole issue
- data related to assessors' experience from the ISO 9000 certification audits to SMEs, which reflects the strengths and weaknesses of SMEs organizational structures and other characteristics
- data related to the way that SMEs maintain their quality management system after the certification, to identify whether they actually use it to achieve business benefits or not.

Step 2 - Initial determination of a number of questions for each area of concern

These questions aimed at pointing out as many details as possible for each area of concern. An effort was made questions to be formulated in a way that would allow the interviewee to express his views and opinions spherically.

Step 3 - Final determination of a number of questions for each area of concern

After the first one or two interviews were carried out with interviewees of each category of data sources, a final determination of the content and the sequence of the questions for each area of concern took place. This happened because in the initial interviews a pilot use of the interview checklists took place and a need for slight alterations was identified, to better facilitate the interview.

The results of the interviews are presented in the Data Collection Results Sheets. These sheets include:

- details for the data collection procedure for each particular case
- a brief report of the interviewee's answer to each question of the Interview Checklist

The structure of these sheets helps relating each answer's brief report to the number of the respective question with which the latter appears in the Interview Checklist.

The completed Data Collection Results Sheets are presented in Appendix B.

1.3 Phase C - Standards, Models and Other Regulatory Documentation Review

1.3.1 Selection of Documentation

The selection of documentation was made, taking under consideration that:

- Certification purposes should be served in the areas of quality and environmental management systems, where relevant standards exist.
- Documentation should be applicable to SMEs.
- All partial elements of documentation should be compatible.
- Documentation should be process oriented.

The documentation selected to be reviewed includes the following:

- ⇒ the ISO 9001:2000 and ISO 9004:2000 standards
- ⇒ the ISO 14001:1996 and ISO 14004:1996 standards
- ⇒ the BS 8800:1996 standard
- ⇒ the Business Excellence Model (1998 British Quality Foundation & EFQM edition) and the Small Businesses Interpretation of the Business Excellence Model (1998 British Quality Foundation edition)
- ⇒ The Regulation (EEC) 1836/93 for Eco-Management and Audit Scheme (EMAS)

1.3.2 Review Procedure

Each element of the documentation was studied and requirements or key concepts were identified.

In case of ISO 9001:2000, ISO 14001:1996 and BS 8800:1996 standards (the first two of which serve certification purposes), an integrated structural basis was created to provide a framework of grouped requirements to be fulfilled by the IMS route-map implementation (it has to be clarified that the BS 8800:1996 standard provides guidelines instead of requirements). The process of grouping requirements and guidelines started by using the ISO 9001:2000 standard as a platform for the structural integration.

The reasons for the creation of the integrated basis of the three (3) standards mentioned above were:

- to modify a fundamental framework of elements for the development of the IMS route-map
- to provide guidance for combining activities when the implementation of the IMS route-map takes place
- to introduce an **integrated approach of these standards**, as a part of the research project outputs.

The ISO 9004:2000 and the ISO 14004:1996 standards, which consist integral parts of ISO 9001:2000 and ISO 14001:1996 standards respectively, were examined as a complementary documentation for the development of the IMS route-map, in terms of providing a conceptual background of management systems design and implementation.

The Business Excellence Model was analyzed as a continuous improvement management approach that has strongly influenced the ISO 9001:2000 and ISO 9004:2000 editions and in consistency with which the IMS route-map should be developed. Each criterion of the Business Excellence Model was carefully analyzed to extract those elements that would contribute to the IMS route-map development. The different approaches of Self-Assessment were also studied, taken under consideration the special characteristics of SMEs.

From the same point of view, a detailed analysis of the Small Businesses Interpretation of the Business Excellence Model was carried out resulting to:

- an important outline of characteristics of small businesses
- key points for the IMS route-map development, in relation to the characteristics mentioned above.

The Regulation (EEC) 1836/93 for Eco-Management and Audit Scheme (EMAS) was studied as an alternative approach for environmental management. Taken under consideration the characteristics of the user group of the IMS route-map (SMEs), this part of documentation contributed to the IMS route-map development, mostly in terms of generic observations.

1.4 Phase D - Results Processing and IMS Route-Map Development

1.4.1 Steps of the IMS Route-Map Development Procedure

As the IMS route-map addresses to SMEs, the first issue that had to be studied and analyzed was their special characteristics and needs as they were indicated by the literature review and the data collection procedure. The analysis led to two (2) groups of results:

- results showing how these organizations operate, their overall weaknesses and strengths and what they actually need and the IMS route-map should provide
- results related to the way quality systems are usually implemented to SMEs and to the characteristics of these systems.

The former group of results strongly influenced the **content** of the IMS route-map as the input of the user group, whereas the latter group of results influenced the **structure** of the IMS route-map and the points related to its **applicability**.

The second issue that had to be studied and analyzed had to do with the requirements and guidelines of the relevant standards, models and other regulatory documentation. The results of this analysis (especially the integrated basis of the ISO 9001:2000, ISO 14001:1996 and BS 8800:1996 standards) determined both the content and the structure of the IMS route-map.

The literature review related to quality, safety and environmental management and to business process analysis influenced the conceptual basis of the IMS route-map and also the issues related to its applicability.

A very important aspect of the IMS route-map development procedure was the design and development of a number of particular **tools** to be implemented within its framework, or even independently. This issue is discussed below.

1.4.2 IMS Route-Map Tools Development

The particular tools of the IMS route-map aim at:

- introducing a systems approach to areas that, generally, are not managed that way in SMEs
- fulfilling the needs of SMEs
- satisfying the requirements of the applied standards
- providing simple, cost-effective ways for SMEs to cope with specific issues, by integrating activities
- facilitating the IMS implementation in SMEs

The development of each tool was based on the following axis:

- ⇒ determination of the areas of concern to be addressed by the tool, that would ultimately specify its **aims**
- ⇒ identification of the **standards requirements to be met** by the implementation of the tool
- ⇒ design of the tool, by modifying the **content** of its particular step or phase and the **sequence** between them, based on the expected final **output** of the tool.

In the tools presentation (see paragraph 3.2), a figure illustrating the phases flowchart of the tool is provided where needed.

The priority of the tools introduction within the framework of the IMS route-map was determined by the integrated basis of quality, safety and environmental management standards (see 2.2.5 and figure 5/2).

A partial implementation of the IMS route-map tools took place in two (2) SMEs (A and C of Table 1/1)), as a pilot for the evaluation of their applicability. Due to the fact that these two (2) SMEs are of **different generic categories of developing activities** (processed materials and services) and their **activities are of totally different type** (production of wires and wire products and provision of medical beauty and fitness services), the results of this partial implementation are considered to validate the concepts in a generic basis. These results are presented in Appendix C.

Table 1/1
SMEs Included in the Data Collection Procedure

SME Code	Type of Activity	Quality System (*)			Data Collection Procedure Details (**)
		E/C	E	N/E	
A	Production of wires and wire products	✓			ICL A / 2.5 years employed as a Quality Director
B	Production of woven and stamped labels for cloths			✓	ICL A / 6 months cooperation as a consultant for a feasibility study
C	Providing medical beauty and fitness services			✓	ICL A
D	Development of software and providing of training services		✓		ICL A / 4 months employed as a quality management specialist in marketing dept.
E	Production of fire resistant bricks		✓		ICL A
F	Production of electrical material		✓		ICL A / Cooperation as an internal quality auditor
G	Production of marble and granite parts and items			✓	ICL A / 4 months cooperation as a consultant for a feasibility study
H	Production of plastic bottles and vessels			✓	ICL A / 4 months cooperation as a quality consultant
I	Production of cosmetics			✓	ICL A / 5 months cooperation as a consultant for a feasibility study
J	Gas distribution services	✓			ICL A / 1 year cooperation as a member of a quality consultants team
K	Publishing annual books relative to marine industry			✓	ICL A
L	Production of army garment			✓	ICL A
M	Development of software applications			✓	ICL A

- (*) E/C: A quality management system exists and it is ISO 9000 certified
E: A quality management system exists and it is not ISO 9000 certified yet
N/E: A quality management system does not exist
- (**) ICL A: Interview(s) carried out based on the Interview Checklist A

CHAPTER 2: PRESENTATION OF THE RESEARCH PROJECT RESULTS

Chapter 2: Presentation of the Research Project Results presents the results of the research project, which were the conceptual and practical input for the development of the IMS route-map.

In this chapter, three (3) axis of results are combined:

1. results of the literature reviewed.
2. results of the data collection procedure.
3. results of the analysis of the relevant standards, models and other regulatory documentation,

and they are focused on the following areas:

- special characteristics and needs of SMEs as the user group of the IMS route-map
- Quality Management as the platform for integration
- Safety Management
- Environmental Management
- the Business Excellence Model approach
- the Business Process Analysis principles and techniques.

Chapter 2 consists of four (4) paragraphs.

2.1 The SMEs Special Characteristics and Needs

2.1.1 General

In this paragraph (2.1) the SMEs special characteristics and needs are presented, as they resulted from the relevant literature review and the analysis of data collected. The presentation is based on the four (4) topics that follow:

- **Size advantages and disadvantages**

Under this topic, the SMEs characteristics that are basically related to their size and the relevant advantages and disadvantages are presented. Some of the issues presented here, are analyzed under one of the rest three (3) topics, because they address to their content.

- **Management style and culture observations**

Under this topic, all issues that are related to the way that SMEs are managed and to the influence of that on the overall culture of the organization are presented.

- **Organizational characteristics**

The characteristics of the SMEs organizational structure and the way these characteristics determine the SMEs possibilities to achieve performance improvement are presented and analyzed under this topic.

- **Human resources parameters**

The SMEs parameters related to human resources and their impact to SMEs overall performance and potential development are presented under this topic.

A final topic presenting the **SMEs needs for survival and development** closes the paragraph, as its main conclusion.

2.1.2 Size Advantages and Disadvantages

The parameter of size which is the most representative of the overall physiognomy of these organizations but not the unique as it has been discussed in paragraph 0.3, where a number of definitions for SMEs were examined, results to certain situations for these organizations that can be evaluated as advantages or disadvantages.

The relevant literature enlightens these situations. The analysis of data collected also forms some relevant conclusions. Nevertheless, a general observation is that the borders between advantages and disadvantages are not always clear and a gray area may exist. Situations that can be evaluated as advantages, could be also considered as

disadvantages from another point of view. Additionally, an advantage can be easily switched to a disadvantage if it is not exploited in an appropriate way.

A. Size Advantages

The Small Businesses Interpretation of the Business Excellence Model [5] refers to a number of advantages of these organizations that are related to their size.

First of all, it refers to their **ability of quick reaction to take advantage of market opportunities more rapidly than big organizations.**

This issue is a matter of SMEs **flexibility**. Due to their size, they can more easily undertake action plans for quickly adapting their business activities to the changing market environment. Flexibility is indicated as an SME advantage also by Fang [1]. Barber *et al* [6] underline that the flexibility of small firms gives them the ability to react quickly to be abreast of fast changing market requirements.

The data collection procedure showed that in most SMEs, decision making is carried out by **one person: the manager / owner**. As soon as this individual realizes changes in the external environment, a «reaction» plan can be determined, immediately communicated to all employees and implemented. This situation reflects the rate of flexibility of SMEs. It is an advantage that must be carefully exploited because it may be switched to a disadvantage if rapid decisions are not influenced by a strategic planning of an appropriate level [5].

Another relevant result of the data collection procedure is that employees usually cover more than one positions. This fact leads to the thought that such individuals have the ability to play a multiple role within the organization, which provides a rate of internal flexibility, if these roles are balanced and not contradictory.

Inherent diversity is indicated by Fang [1] as a positive characteristic of SMEs in addition to their flexibility, which can also be exploited for the benefit of these organizations.

The Small Businesses Interpretation of the Business Excellence Model [5] refers to the fact that the small size of these organizations is related to the advantage of **simpler management structures** that ultimately lead to a **more effective management**. This observation is complemented by the fact that SMEs **informal but direct communication paths** facilitate the management activities and the information flow, which also incorporates a number of risks. These two (2) points are analyzed in 2.1.3 together with the relevant results of the data collection procedure, as they address to management style issues.

B. Size Disadvantages

The most important disadvantage of SMEs that is primarily related to their size is that of **limited available resources**.

Barber *et al* [6] address to three (3) areas of this point:

- financial resources
- skilled labour
- technology

The limitations of **financial resources** for small firms, according to Barber *et al* [6] are explained by a gap that exists between the actual needs of these organizations and the willingness of capital holders to meet those needs. The authors do not place all the blame upon the lenders, as these organizations very often lack the ability to present convincing business plans.

This last point is related to the **lack of strategic direction** [5] that characterizes these organizations, because a sound and adequate business plan has to reflect a long-term perspective, based on a stated policy, a systematic analysis of market parameters and a realistic set of business strategy, tactics and objectives.

Data collection procedure resulted to the fact that most of SMEs examined, did not approach the issue of analysis of market parameters at all (see also 2.1.4), so the possibility of preparing a convincing business plan is eliminated. The thesis author experienced this particular issue in SME A when the organization was in a difficult financial position and asked for some extra funding from banks. Banks required an analytical business plan, proclaiming that this was the only way to be persuaded to provide funding to SME A. Actually, it was very difficult to prepare the business plan, as no marketing analysis was available and no strategic planning had ever been made.

Scarborough *et al* [7] refer to the problem that small businesses face in **having access to capital**, as an external environment factor related to economies of scale that virtually prohibit these organizations from utilizing other sources of capital, such as public stock issues, and oblige them to depend on small local banks to meet their requirements for capital. The authors also refer to the additional problem of the cost of capital, which, due to high interest rates, puts a substantial burden on the production cost and makes the borrowed capital inhibitory for small businesses.

Fang [1] also indicates the limited financial resources as an aspect of the minimal available resources of SMEs.

The issues mentioned above have been fully identified by the thesis author's experience from SME A, where the 10 % of the production cost was the cost of capital. The issues were indicated also by the manager / owner of SME C, during his cooperation with the thesis author for the pilot implementation of the IMS route-map tools (see Appendix C). Additional difficulties for SMEs A and C in accessing to capital, occurred due to the following issues:

- limited real estate securities
- low volumes of sales
- strict requirements for drafts and checks as guarantees

The manager / owner of SME I also underlined the fact that the organization was incapable of making investments without external funding. Conclusively, the issue of limited financial resources is a serious disadvantage for SMEs basically (but not exclusively) related to their size.

The limitations of **skilled labour** are described by Barber *et al* [6] in terms of:

- the difficulties that small businesses face in attracting and retaining skilled labour
- the tendency of small businesses to employ lower-qualified employees
- the lower levels of training,

yet the authors point out that few studies have been able to assess the real relationship between the three (3) issues mentioned above and the size of the organization. Nevertheless, also Fang [1] underlines in his study the lack of expertise as a characteristic of SMEs, together with the issue of staff shortage.

An analysis of these issues, together with the relevant results of the data collection procedure is presented in 2.1.5, as human resources parameters of SMEs.

The issue of **access to technology**, as a resource limitation that SMEs face, has been discussed by Barber *et al* [6] concluding to the fact that the most important factors determining these organizations' propensity and ability to access to external sources of technology are internal to the organizations, the most important of which are the outward-lookingness of management and the strategic ability of management to integrate externally acquired technology into an overall business plan. In 2.1.3, these points will be discussed furthermore, in relation to the results of the data collection procedure.

Fang [1] refers to the **time parameter** which, though it is important for organizations of any size, it becomes crucial for SMEs, due to the resource limitations and to the lack of technical skills.

Actually an SME has to respond quickly to the fast changing market needs and to minimize the times needed to carry out all processes, especially the customer-related ones. As it has been resulted from the data collection procedure and also mentioned before, in SMEs, decision making is almost always carried out by one person: the manager / owner. To respond quickly, this individual needs a background of monitoring all elements that can influence the time needed. On the other hand, processes had to be clearly defined and analyzed for achieving minimization of their duration and elimination of duplication and repeat without purpose. Process ownership can also help to that [5]. Finally, rapid undertaking of corrective and preventive action is of critical importance, as SMEs cannot afford long-term non-conformities that increase their operational cost.

Another disadvantage related to the size parameter of SMEs is that these organizations may **rely on few key customers** and if something goes wrong, the impact could be intolerable [5]. This happens because, the production volumes or the extent of the ability of services provision are limited for SMEs. The lack of systematic marketing

activities, as the data collection procedure showed, makes this issue even more serious (see also 2.1.4).

Finally, a disadvantage that is indicated by both Barber *et al* [6] and Scarborough *et al* [7] has to do with the fact that small businesses **cannot cope with complex government regulations**, while these regulation are the same for small, medium and large organizations. This point includes the safety and environmental legal requirements, which are often hardly met by SMEs, as it is shown by the data collection procedure.

2.1.3 Management Style and Culture Observations

Management of SMEs is, according to Scarborough *et al* [7], the chief problem that leads these enterprises to failure.

The critical role of SMEs management is indicated by both the relevant literature and the results of the data collection procedure. The Small Businesses Interpretation of the Business Excellence Model [5] points out that:

- the way in which smaller organizations are **managed is strongly influenced by the personal style of the most senior manager**
- the way in which the most senior manager relates to his or her employees is absolutely fundamental in establishing the **culture and values** of the organization

The results of the data collection procedure lead to the same conclusion. The following examples are very indicating:

- In SME A, the centralized management mentality of the owner (who actually managed the organization) can be identified in every organizational activity. As he is the one who finally decides for everything, being willing to change even a decision of the general manager, no employee feels that a decision or proposal he or she makes will be the finally implemented one, so their involvement becomes weak and their contribution is continuously reduced. It should be mentioned here that the owner is the only individual deciding for issues of new technology, but the criteria he is based on are subjective and not related to an organizational strategic direction. His criteria reflect what he likes and not what the organization needs, so the technological level of the organization remains low. Additionally, since the owner uses to be informed for the same issue by a number of people from different positions and organizational levels and to rely on the viewpoint that seems to be the more “convenient” one, actually systematic and sound reporting activities do not take place. This situation took place when he started his business activities many decades ago, but he was not willing to change it and create an organized information flow system. Finally, his preference in mixing people and issues instead of delegating specific actions to specific people, results to contradictions that every day occur and, generally, to a structural failure.
- In SME B, the creative personality of the manager / owner influences the atmosphere of the organization and the mentality of employees, who are innovative

and willing to be involved in new activities. The technological level of this SME is very high, because the manager / owner is oriented to the direction of continuous technological upgrading of the machinery and operating systems and he considers technology as a critical parameter of business success.

- In SME C, the general manager influences the people of the organization very strongly. Her presence in a branch makes all employees of that branch feel secure and inspired and they enforce their efforts, while her absence immobilizes them and their performance is visibly lower.
- In SMEs F and G, the open-minded mentality of the managers / owners makes the overall organizational atmosphere positive.
- In SME I, the old fashioned mentality of the manager / owner creates an atmosphere of fear which becomes a barrier to employees involvement and effective contribution.

Considering that in most SMEs the senior managers are the owners (from the thirteen (13) SMEs examined, eight (8) are managed by their owners, one (1) is typically managed by another individual but actually managed by the owner and the four (4) rest are managed by other individuals, but the three (3) of them are subsidiaries of bigger organizations), the power of influence of the latter is enforced by the fact of ownership.

The overall situation shows that SMEs suffer from a variety of subjective management practices, exclusively determined by individuals (senior managers or managers / owners) of different personalities and different beliefs. Additionally, these individuals very often want to keep control of the key decision making, resisting to delegate responsibilities to other people and insisting on the "one man show" methodology, as Barber *et al* [6] underline.

It must be said that, in the areas of quality, safety and environmental management systems, the role of top management commitment is critical and the fact that in SMEs the influence of senior management to the overall organization is of crucial importance could be a strength, because:

- senior management committed to quality, safety and environmental management principles can inspire and communicate them to the whole organization in an easier and quicker way
- senior management's attitude reflecting these principles could rapidly change the culture of SME.

Obviously such commitment requires SMEs senior management to be aware of these principles, which does not happen very often, as the data collection procedure showed.

An issue that is related to the management of SMEs has to do with the managerial abilities, competencies and training of managers / owners. Actually, having

entrepreneurial flair is something different from having the ability to run a business and to manage people.

According to Barber *et al* [6], the level of competencies of the small businesses managers / owners is low, regarding basic managerial skills, and knowledge in the areas of finance and long-term planning in the market. Also, training of the managers / owners hardly takes place due to lack of time availability and to uncertainty factors in relation to the provision of that training (e.g. the quality of training, the suitability of relevant institutions etc.).

The SMEs managers / owners incompetence is underlined also by Scarborough *et al* [7] who indicate their lack of experience in the business field they enter.

This issue was not examined by the data collection procedure. Only in case of SME A, where a very detailed examination of management and organizational issues has taken place, it can be noted that the owner has no managerial skills but he is an expert in the technical area of the organization's activities.

In the Small Business Interpretation of the Business Excellence Model [5] it is pointed out that a reason for the senior managers' influence to the overall organizational culture is that they are involved in day-to-day activities. This is a reality to most SMEs because of

- lack of human resources
- lack of skilled employees
- the managers / owners mentality that leads them to get involved in everything for assuring that they control everything

The whole situation clarifies that the role of SMEs' senior managers is different from that of bigger organizations' senior managers. The former have to balance between:

- their personal involvement to trivial things that is necessary
- their personal involvement to trivial things that can be avoided if they decide to delegate responsibilities and allow other people to be actually involved
- their involvement in strategic long-term planning activities.

Regarding the issues of simpler management structures and informal but direct communication paths that characterize small businesses [5], issues that were also pointed out in 2.1.2, the following aspects must be enlightened:

- The data collection procedure showed that a considerable number of SMEs have a process-oriented and rather flat organizational structure. The fact that managers / supervisors are few and the overall control and decision making are carried out by the senior manager (employee or owner), actually leads to simpler management structures and procedures. As problems solutions are given directly by the senior managers, internal arrangements are simplified but people involvement is weakened and personnel development hardly takes place (see also 2.1.5).

- **Process simplicity** [5] may be a characteristic of small businesses, but it is not absolutely related to their size. In fact, the level of process simplicity depends on:
 - ⇒ the nature and complexity of the business activities
 - ⇒ the internal organizational structure
 - ⇒ whether processes have ever been clarified, redesigned and improved
- The lack of designed and formal communication system is a result of:
 - ⇒ not clearly defined responsibilities and authorities of employees
 - ⇒ direct communication of the senior manager with employees of all organizational levels in a daily basis
 - ⇒ loose organizational structures

According to the Small Business Interpretation of the Business Excellence Model [5], good informal communication can be a strength and often means that all personnel get the information they need to do their job, but the risk of relying on this kind of communication is that occasions may arise when:

- ⇒ information does not reach key individuals
- ⇒ issues fail to surface without the neutrality that formal channels afford
- ⇒ disciplinary matters become more difficult to handle.

The points mentioned above are very critical, especially for SMEs where organizational structures hardly exist. By examining the results of the data collection procedure, it can become very obvious that the way managers / owners handle things, enhances informality in internal and also external communication (e.g. the fact that they personally carry out processes related to customers). The SMEs management style and culture reflect informality in communication and, according to the thesis author's opinion, this situation is one of the most serious handicaps of these enterprises, because:

- ⇒ it does not allow organizational arrangements to be established and maintained
- ⇒ it does not help people develop a feeling of responsibility for what they do
- ⇒ it creates an operational framework unfamiliar to the management systems concepts
- ⇒ it allows the personal factor to strongly filter information exchanged between individuals
- ⇒ it makes performance monitoring and information collection and processing activities difficult to carry out.

The point is to design correct procedures for introducing communication formality to SMEs that will fit them and be applicable to them.

2.1.4 Organizational Characteristics

A general result of the data collection procedure is that the organizational structure of SMEs is poorly, if ever, designed and consequently its performance is not satisfactory. More precisely, SMEs are characterized by **inadequate organization schemes** and this issue can be identified through operational weaknesses, high internal cost and insufficient delegation of responsibilities and authorities among employees. Barber *et al* [6] mention the fact of inappropriate organizational structures of small businesses as one of the systematic and pervasive internal problems that these firms face.

Actually, in most SMEs examined within the framework of the data collection procedure, the existing organizational structure has been formed by their fundamental operational needs and has not been designed to achieve a continuously improved and cost-effective performance. A systems approach can be identified only in SMEs where a quality system according to ISO 9000 standards is implemented. This point is mentioned by Rooney [8].

A number of organizational features of SMEs that were identified by the data collection procedure are outlined below:

- Distinct departments or functions for production, technical support, financial and accounting and sales exist.
- **Personnel issues** are carried out only in terms of legal arrangements (e.g. retirement, pensions, insurance issues, compensations etc.), usually together with administration activities and no human resources management approach can be identified (see also 2.1.5).
- It is rather difficult to talk about real **marketing activities** in most SMEs and, if such activities take place, they are based on the selling concept instead of the marketing concept, as they have been set by Kotler [9] and are illustrated in figure 1/2. More analytically, SMEs adopt selling practices focused on their needs, «the needs of the seller» as Kotler [9] points out and aim at profits through high sales volume, instead of marketing methodologies that are focused on «the needs of the buyer» and lead to profits through customer satisfaction. An example is that of SME C, where sales personnel is enforced to achieve high turnover objectives, but no measurement of the customer satisfaction rate takes place. In SMEs, distinct marketing departments exist rarely and, even more rarely marketing analysis activities take place. Customer requirements are not systematically searched, analyzed and documented. Selling activities are carried out merely to fulfil the financial needs of the organizations. In cases where a quality management system according to ISO 9000 standards is implemented, organizations tend to involve marketing and sales departments or functions later and less than production and technical departments or functions, because the crucial role of marketing and sales activities in quality assurance and customer satisfaction issues has not been realized. Scarborough *et al* [7] refer to a weakness of small businesses which is related to both marketing and financial activities: their **poor customer credit practices**.

- Even in SMEs where a quality management system exists and operates, statistical techniques are poorly implemented, as **internal data monitoring** and processing activities do not take place systematically. For example, in SME A, a great amount of information is collected throughout the whole organization but:
 - ⇒ in some cases it is actually useless as it is not related to any kind of performance indicators
 - ⇒ no designed processing activities are carried out and valuable information may be locked in files and forgotten
 - ⇒ duplication in collection of information is identified, due to inadequate internal information flow activities
- Almost all SMEs examined do not have a distinct **purchasing department** or function. This fact may mean that a process oriented approach to purchasing activities is adopted but it may also mean that purchasing activities are not carried out in a systematic and controlled way, which can result to:
 - ⇒ inadequate control of suppliers
 - ⇒ non-existing or inefficient evaluation of suppliers
 - ⇒ poor inventory management (beginning from incoming products and expanding to the whole supply chain and to final products)
 - ⇒ increase of cost.

Scarborough *et al* [7] refer to insufficient inventory management and control resulting to amounts of working capital tied up in an accumulation of needless inventory and also to improper pricing, as a reason of small businesses failure.

- **Safety and environmental issues** are not managed with a systems approach and they are faced «ad hoc». Health and safety committees are immobilized and do not contribute to the improvement of the organization's performance in the relevant areas. Due to the fact that no monitoring activities take place, the cost of loss is not calculated to alarm for the need of improvement activities.
- The characteristic of informality in internal communication is discussed in 2.1.3, because, though it is related to the organizational structure of SMEs, it is determined and enhanced by their management style.

2.1.5 Human Resources Parameters

As it has been also mentioned in 2.1.2, the issue of **limitations of skilled labour** appears in literature as a size characteristic of SMEs. The data collection procedure showed that in most SMEs, the level of employees' skills and competencies is not high and, in some cases the management of SMEs acknowledge the situation (e.g. SME C). It should be underlined that this situation does not happen to SMEs that are subsidiaries of bigger organizations, probably because they incorporate human resources management practices of the parent organizations.

The reasons for the whole issue are related to the following facts:

- SMEs cannot afford to satisfy the remuneration requirements of high-qualified personnel in all organizational levels and / or
- SMEs do not have the time or resources to invest in personnel through training activities or people development programs, so the level of personnel remains more or less in the level it was when they entered the organization. This fact can be proved by the results of the data collection procedure, as it is found that training activities do not take place in a systematic way or do not take place at all in these organizations.

Referring to the latter point, the Small Business Interpretation of the Business Excellence Model [5] underlines that in small businesses, **training and development** are usually job-specific and a general approach is not adopted. Barber *et al* [6] indicate a number of key reasons for the small businesses undertaking less training per employee than larger firms, the most important of which is that, as lower pay and other work conditions do not assure that an employee will stay for long in the small firm, the willingness of that firm to train and invest in people is reduced. According to the authors, even if small firms set off from a fairly high-quality base, their low level of training places them an increasing disadvantage over time.

Fang [1] also points out the fact that training in SMEs often gets “second billing”, as a reason for their lack of expertise.

The data collection procedure showed that **distinct human resources departments** or functions do not exist in most SMEs. This issue been mentioned also in 2.1.4 and it means that activities like identification of training needs, personnel evaluation and establishment of appraisal systems hardly, if ever, take place.

The whole attitude of SMEs against personnel development and training arrangements, together with the limited career prospects they offer, as it is underlined in the Small Business Interpretation of the Business Excellence Model [5], discourages skilled and ambitious individuals to enter or remain in such organizations.

Another critical issue for SMEs, related to human resources, has to do with the fact that they heavily **rely on key individuals** [5], so the knowledge that has been held in the minds of few people needs to be passed on to others, both to ensure that more employees understand more about their job functions and also to preserve information in case that key individuals would leave the organization. The thesis author experienced this situation very strongly in SME A, where work knowledge had not been documented (especially before the quality management system implementation) and only very few individuals were fully aware of the inner elements related to the work that is carried out. Misunderstandings, misinterpretations and an atmosphere of «hidden knowledge» were the characteristics of the cooperation between people and resulted from the insecurity the individuals mentioned above felt for their position. The feeling of insecurity made them try to remain essential for the organization, not because of what they do but because of what they know.

As SMEs usually do not have the opportunity to establish and document work methods, techniques and knowledge as part of their own resources, these elements are directly related to certain employees who very often deprive other people of the possibility to learn and understand their job more deeply. The whole thing puts a serious barrier to people development and involvement in these organizations.

The Small Business Interpretation of the Business Excellence Model [5] points out another issue related to human resources, that can be considered as an advantage of small businesses: the increased ability of employees to **contribute positive improvement suggestions** due to the fact that they can see quite clearly how their job relates to the achievement of company goals. If this issue is exploited through systematic people involvement programs and activities, it can obviously become a strength for these organizations.

An element related also to the organizational characteristics of SMEs has to do with the **multiple roles of employees** and the inevitable conflicts that may occur between these roles. This element, combined with the insufficient delegation of responsibilities and authorities among employees, was resulted from the data collection procedure and can be considered as a fundamental problem of SMEs with a number of negative consequences:

- gray areas between the roles, responsibilities and authorities are created, leading to misunderstandings between people, delays, duplications and, sometimes, bad communication and relationships
- the feeling of accountability becomes loose
- objectives cannot be easily set to individuals
- the quality, safety and environmental management standards cannot be applied unless the key issue of responsibilities delegation is effectively managed.

It can be said that the human resources parameters are rather neglected in most SMEs, as they are not considered to be an area to invest in. The pressure put by the difficulties that SMEs face in their every-day activities do not allow them to examine and analyze this issue, so no outstanding improvement can be expected in most cases. Additionally, the absence of an overall systems approach burdens even more the problems caused by the insufficient human resources management in SMEs.

2.1.6 SMEs Needs for Survival and Development

According to Barber *et al* [6], the weight of the evidence on market structure and the competitive positioning of small firms suggests that the really systematic and pervasive problems faced by small firms are **internal to the firm**, such as the technical skill base, the management systems and processes, appropriate organizational structures and the availability of skilled managers.

Longencker *et al* [10], monitor some statistical data taken from Business Failure Record (New York: Dun & Bradstreet, Inc. 1989, p.19) relating to the causes of small businesses failure; according to this source, the 57.8 % of these failures have been caused by economic factors (inadequate sales, insufficient profits, poor growth

prospects), the 26.4 % have been caused by finance factors (heavy operating expenses, insufficient capital), the 12.0 % have been caused by experience factors (lack of business knowledge, lack of experience, lack of managerial experience) the 0.9 % have been caused by wrong strategy and the rest 2.9 % have been caused by fraud and neglect.

Economic factors of failure, as they appear in this statistical data are related to the size disadvantages of these organizations and to their organizational characteristics. Financial factors of failure are related to the same parameters. Experience factors are related to the management style of these organizations and the human resources parameters. Obviously, this data converges to the overall results for the SMEs special characteristics.

Here, the needs of SMEs for survival and development are outlined, reflecting the broad areas of concern for the IMS route-map.

1. Establishment of a strategic direction to an extent suitable for the size of SMEs, based on stated mission and vision and a system of values to act as a framework for implementing long-term policies and objectives. Introduction of the quality management principles to be used by SMEs for building up a new business mentality and developing more effective management practices.
2. Culture change begun from the top management's demonstrated commitment to it and cultivated to all people in the organization through top management's attitudes and mentality.
3. Development of a system for monitoring quantified information related to the performance of the organization in a continuous basis, to enable the top management to respond quickly to any circumstance. Anonymous [11], talking about the implementation of a quality management system according to ISO 9000 standards to small firms, outlines their need for a system of continuous assessment and improvement of their activities, due to the today's tough operating climate, which would be a very important contribution to their growth process.
4. Design and development of a sufficient marketing function based on the marketing concept as it is stated by Kotler [9], providing also internal marketing activities and assuring the continuous satisfaction of customer requirements, needs and expectations.
5. Implementation of improved inventory management practices, materials control and purchasing activities.
6. Establishment and /or enhancement of human resources management activities, including training and employee involvement and development programs.
7. Determination of process owners and clarification of roles, responsibilities and authorities among personnel. Thompson *et al* [12], referring to process owners assignment, propose to combine functional and process management, as in SMEs, the process owners retain their functional responsibilities as well.

8. Introduction of formal communication paths to avoid all serious disadvantages caused by communication informality and uncontrolled information flow.
9. Development of a systematic way for SMEs to cope with health and safety issues and with the environmental impacts of their activities, as a means for assuring compliance to the legal requirements and also for cost reduction.
10. Certification of management systems against international standards, for SMEs to spread their activities to a wider market environment. The issue of the difficulties that these organizations face in understanding and applying standards, indicated by Fang [1], could be faced through the cooperation with a specialist together with the top management's appropriate training and personal involvement.

Conclusively, it can be said that all issues mentioned above converge to the SMEs need for **introducing and establishing a management systems approach** to their business mentality and overall operational and organizational structure. Such approach can lead these organizations, to:

- reduction of internal cost,
- effective resource management
- continuous performance improvement,

issues of vital importance for their positive evolution.

2.2 Analysis of IMS Parameters: Quality, Safety, Environmental Management

2.2.1 General

As the Ph.D. research project aims at developing a route-map structured management system for SMEs to use to integrate all management systems and / or activities relating to quality, safety and environmental issues, it can be said that quality, safety and environmental management constitute the «IMS Parameters».

These parameters have been studied and examined in Phases A and C of the research project. In this paragraph (2.2), the relevant results are presented. It must be underlined that quality management is considered to be the platform for the integration.

For each of the IMS parameters, a detailed analysis of the literature review is presented, in combination with the requirements of the standards which are the fundamental background for the IMS route-map development (ISO 9001:2000 / ISO 9004:2000, BS 8800:1996 and ISO 14001:1996). When needed, references to conclusions of the data collection procedure are made (which are fully presented in paragraph 2.1). A final framework of the three parameters is formed to be used in the IMS route-map development procedure.

The results of the analysis of the Business Excellence Model approach are presented in a separate paragraph (2.3), for this approach is examined as a wholeness, addressing to the IMS route-map.

2.2.2 Quality Management as the Platform for Integration

Quality management systems have been developed and implemented initially aiming at assuring that the product or service requirements specified by the customer are met in a continuous basis. From the fourteen (14) principles that Deming [13] introduced for achieving competitiveness through quality, the aim of quality management systems has been evolved to the satisfaction of the following organizational needs:

- provision of organization's capability to achieve customer satisfaction by meeting or exceeding customer requirements
- development of a background for establishing a continuous improvement process and prevention of non-conformity
- provision of a structural platform for management systems integration.

Studying the ISO 9001:2000 standard, one can clearly see that this broadened orientation is underlined. More specifically:

- The new edition no longer includes the term «quality assurance», as it is focused on the quality management system requirements for an organization to demonstrate its capability to meet customer requirements.
- Emphasis has been put on the fact that the ISO 9001:2000 standard provides improved compatibility with ISO 14000 standards.
- The Quality Management Process Model, included in ISO 9001:2000 standard (presented in figure 2/2), recognizes the significance of customer's role in the horizontal closing loop.
- The processes integration in a both horizontally and vertically close loop manner that can be seen in the quality management process model mentioned above, creates a mechanism of a continuous improvement process to be developed and implemented.
- The structure of the standard as it appears in the new edition allows a more extensive tailoring to take place, depending on the special characteristics of the organization that implements it.
- A close relationship between the ISO 9001:2000 standard and the Business Excellence Model can be identified. However, the aims of the standard differ from those of Business Excellence Model; the ISO 9001:2000 standard is a requirement document, according to which organizations undertake a third party audit for certification, to demonstrate capability to meet customer requirements, whereas the Business Excellence Model provides a mechanism of criteria for organizations to assess their performance against excellence. Rooney [8] clarifies the difference between the aims of the ISO 9001:2000 standard and the Business Excellence Model.

For the aims of the research project, the ISO 9001:2000 standard is considered to be the basic requirement document in consistency with which the IMS route-map is going to be developed. An outline of the major elements of the standard follows:

- **Management responsibility**
- **Resource Management**
- **Process Management**
- **Measurement, Analysis and Improvement**

It must be noted that the guidance for the development of a complete quality management system for the organizational improvement, provided by the ISO 9004:2000 standard will be taken under consideration, as this standard forms a consistent pair of international standards with the ISO 9001:2000 standard. Both these standards incorporate all aspects of a quality management system.

In relation to the evolving content of quality management, Jonker *et al* [14] view that quality will be seen as a management philosophy instead of an organizational function or specialty in the foreseeable future. They also point out that a shift in emphasis will occur towards people as the major vehicles for quality, requiring an increasing effort to integrate already existing quality assurance systems. To put it in other words, the authors indicate the evolution of quality management, from the orientation of just

assuring customer satisfaction to the role of a platform for overall management integration. They also address the critical role of human parameter.

As the data collection procedure results showed, quality management systems and the relevant standards have been considered by SMEs (and also by many larger organizations) as the path that leads to gaining a world - wide recognized certificate to use as a marketing tool. A low percentage of these organizations become to realize that the whole process can provide internal benefits as well as benefits from the external environment, and that happens always after the implementation of the quality system has proceeded to a considerable extent. Certification seems to be much more important for SMEs than any other benefits that a quality management system can offer. To help SMEs exploit the totality of these benefits, the cultivation of:

- a «management systems» approach to all activities within these organizations and
- the concept of integration of systems

has to take place among SMEs employees, for achieving the necessary **conceptual switch** and effectively implementing the principles of quality management. This cultivation cannot be accomplished unless the top management is fully committed to and involved in that.

The ISO 9001:2000 standard outlines the **top management responsibility** (clause 5) covering:

- its commitment to meeting customer requirements, by creating an environment of awareness and fulfillment of them
- the establishment of a quality policy, quality objectives and planning
- the establishment of a quality management system
- reviews of the quality management system
- provision of necessary resources.

It can be seen that the requirements for the role of top management define it as the most crucial parameter. The data collection procedure showed that in few cases of SMEs in which the top management discovered the opportunities given by the quality management systems and ISO 9000 standards for improving the organizational structure and achieving benefits from inside alterations, and remained strongly committed to them, the implementation of the quality management system was satisfactory and organizations were certified. Additional results of the data collection procedure, proving the extremely serious role of top management for the successful implementation of a quality management system are the following:

- the attitude of top management towards the whole effort determines how issues like personnel unwillingness to contribute to that effort and resistance are going to evolve
- top management can or cannot achieve to improve personnel awareness in relation to quality management system.

These results are in full agreement with the role of top management in SMEs, as it has been analyzed in 2.1.3.

The thesis author experienced the significance of the role of top management in the success of a quality management system implementation project, as a quality director in SME A. During the phase of implementation of the quality system, the director general participated in all the relevant activities, continuously supported the role of the quality director and personally led employees to realize and accept the new situation of the organization's structure and operation. His overall attitude towards the effort of the implementation of the quality management system reflected his commitment to quality management principles. These principles were successfully transferred to all organizational levels, because they were established in the organization by the top management.

Johnson [15] refers to top management commitment as the absolute prerequisite for implementing a quality management system, invoking what Deming, Juran, Crosby, Feigenbaum and Peters have already said. He adds that top management has to be an active, daily, visible presence in the process of the quality management system implementation. This fact becomes even more important, taking under consideration the role of top management and its enhanced significance in SMEs (see 2.1.3).

The **determination of customer needs and requirements** (subclause 5.2 of the ISO 9001:2000 standard) and the adoption and documentation of these requirements as defined organizational requirements is the fundamental step for quality management systems and also for integrated management systems. The data collection procedure showed that in SMEs, when a quality management system design and implementation project is carried out, the marketing and sales departments / functions are not involved in the project from its initial phases and not as intensively as the technical and production departments / functions. This result may mean:

1. Top management relates such a project to customer and market place only through its typical output (which is the ISO 9000 certificate) and not virtually, beginning from the determination of the customer requirements.
2. Marketing and sales departments in SMEs do not operate as the interface between the organization and the market place through which, information and messages are transferred to both directions, but they are mostly focused on pure sales and order processing activities, so their role in the quality management system design and implementation project is underestimated (the weaknesses of SMEs in relation to marketing activities has been analyzed in 2.1.4).
3. SMEs do not perform as customer – focused organizations.

It has to be a priority for top management to inspire a changed attitude to the overall organization, in relation to the importance of considering customer requirements, expectations and needs as the initial parameter that determines the operation and evolution of the organization. The achievement of such changed attitude and commitment needs to be supported by marketing activities based on a systems approach.

ce. The establishment of **quality policy** (subclause 5.3 of the ISO 9001:2000 standard) may offer to the top management of SMEs a structured way to think about the organizational mission, vision and values, probably for the first time.

iau, A quality policy statement prepared by the top management, reflects how an organization approaches, in terms of concepts and principles, the implementation of its strategy in relation to achieving customer satisfaction and increase of its market share. In SMEs the process of preparing a quality policy statement is needed to begin from the origin of the formation of an organization: the establishment of a mission, vision, a set of values and the relevant strategy, which determine its profile and should be tailored to its realistic characteristics. A movement like that is of vital importance for SMEs, due to the fact that these organizations do not usually have the opportunity to make such an approach.

LJ. The **establishment and documentation of quality objectives** (subclause 5.4 of the ISO 9001:2000 standard) leads the organization to determine a required level of improvement compared to a baseline situation, that has to be achieved and to link the improvement achievement with the role of all employees. As the ISO 9004:2000 standard highlights, for the establishment of the quality objectives, employee commitment has to be ensured. Therefore, a dynamic interaction is needed between the top management that sets the objectives and the individuals of all organizational levels who are supposed to achieve them. When objectives are integrated, this interaction has an even more significant role, since the commitment needed from employees is progressively expanded to all their activities and, inevitably, to the way they perform them.

Quality planning is a core management process for achieving objectives. It should be referred that for SMEs planning and priorities setting is critical for achieving their objectives, due to the fact that their resources are limited.

The ISO 9001:2000 standard relates more obviously quality planning to quality objectives than it happened in the ISO 9001:1994 standard, where quality planning was mostly linked with the technical operation of the quality management system. This difference reinforces the views expressed above about the evolution of quality management, from the aspect of the standard.

The establishment of a documented **quality management system** (subclause 5.2. of the ISO 9001:2000 standard) is supposed to be adapted to the activities and the size of the particular organization, according to the standard.

The data collection procedure showed that the quality management system documentation in SMEs is poorly tailored to their particular characteristics and activities. This happens because very often documentation is built up for certification purposes and not for serving organizational needs. It should be mentioned here that in many cases documentation is mostly prepared by consultants and the contribution of the employees of SMEs is not satisfactory, as the data collection procedure showed. For a fully tailored quality management system documentation to be developed:

- the prime role should be undertaken by the organization itself; consultants should give the directions and provide technical support
- the design of the documentation should take under consideration the results of quality planning and should reflect the quality objectives.

Referring to integration, building up an integrated management system documentation is very helpful to SMEs and provide flexibility and save of time. Hall [16] refers to the fact that especially staff lower down the management line may become overloaded if they receive separate manuals and procedures for each management system implemented.

According to the thesis author's opinion, systems integration does not mean documentation integration. The latter is the result of integration and not the «vehicle» for it. Integration of systems should be considered as the creation of a common business framework operating through processes that integrate the areas of concern. Starting the integration effort from merging documentation is a rather superficial approach and may withhold the whole effort.

Management review (subclause 5.6 of the ISO 9001:2000 standard) based on the results of activities related to measurement, analysis and improvement, closes the loop presented in the Quality Management Process Model (see figure 2/2) and also proves the sustained commitment and involvement of the top management in concepts and implementation of the quality management system. According to the ISO 9004:2000 standard, it may be useful also to invite persons from other management levels and functions to attended these reviews. In cases of SMEs, where the number of individuals of the top management level (apart from the general manager / owner) is usually low, this view is considered rather positive, for enforcing the feelings of responsibility to employees and enhancing employee involvement.

The data collection procedure showed that a usual non-compliance of SMEs during ISO 9000 certification is that management reviews have not taken place. It becomes obvious that in such cases, the exclusive concern of the organization is the certificate and the awareness of top management is very low. Unless the top management is fully aware of the concepts and principles of quality management, commitment cannot be achieved and the necessary forces for the change of thinking of all employees do not exist.

Commitment and change of thinking are always linked with the role of top management, because top management influences and determines the attitude of people. In terms of integration, Moore [17] emphasizes that a lack of commitment make organizations unwilling to adopt an integrated approach and also that unless people realize that management systems are tools to help and not hinder them, an integrated approach cannot be adopted.

Resource management, linked with top management responsibility of resource allocation, is an element of the ISO 9001:2000 standard requirements (clause 6), focusing on two (2) axis:

- human resources

- other resources, including information, infrastructure and human and physical factors of work environment.

The aspects of managing **human resources** (subclause 6.2 of the ISO 9001:2000 standard) in a quality management system implementation process and, furthermore, in integrated management systems, are defined below:

- ⇒ Clarification of roles, responsibilities and authorities among personnel, which should take place prior to any other arrangement, as it is fundamental for designing any kind of management system.
- ⇒ Determination of training needs and provision of adequate training programs for all personnel, which are critical factors of successful management systems implementation and operation.
- ⇒ Development of a teamwork environment, as an organizational value that leads to improved communication mechanisms and lean, cost-effective organizational structures suitable for adopting a management systems approach.
- ⇒ People involvement and empowerment, as a fundamental management principle, that assures sustained employee performance improvement.
- ⇒ Establishment of systematic employee development activities, that enhances the efforts of organizational culture change and acts as a track for achieving continuous improvement of organizational performance.

ISO 9004:2000 outlines a number of issues related to human resources management, the most important of which are the following:

- the connection of personnel training with the organization's policies and objectives, a fact that indicates the involvement of top management with training planning activities
- the identification of the qualification level and competencies necessary to achieve the organization's objectives, considered in personnel selection, recruitment, training, development of skills and continuing education
- the increase of awareness, motivation and involvement of personnel, through policies and objectives promoted by top management, a fact that enhances the results of the organization
- the recognition of personnel for achieving objectives and targets.

The literature reviewed refers to the aspects of human resources management extensively. Bounds [18], presenting case studies in the area of quality, underlines the amazing results of focusing the energies of all people in an organization to clear business objectives. Munro-Faure [19] analyses that organizations in the U.K. are committed to achieving performance improvement through the involvement of people, situation that delivers improved business performance.

Kehoe [20] views that people have to be part of the quality development of an organization. He also examines the issue of cultural change of an organization, as a combination of the following key elements:

- teamwork, as the vehicle for change and for involving people to quality improvement
- management style that supports quality development and provides effective communication

The author emphasizes the role of motivating people for the success of the quality management and culture change efforts.

Shtub *et al* [21], referring to the basic components of Total Quality Management, focus on the role of problem-solving teams in achieving continuous improvement. Such teams are engaged in identifying customer problems, finding solutions and then providing ongoing control of the improved process. By this way, employees are empowered and management improvement efforts are focused on process problems.

According to the opinion of the thesis author, people should be considered as the core element of the quality development of an organization. Moreover, when an integrated management system that uses quality management as the platform for integration is to be implemented, the significance of people involvement increases. Teamwork and proper training are the main tools to assure it.

Training is the more effective way to start up the process of people involvement. Training of employees can be divided to three (3) categories:

- Continuous training in a job-specific basis for assuring that the knowledge, competencies and level of expertise of personnel are always adequate for them to carry out their work effectively and efficiently.
- Continuous training for people development and performance improvement
- Focused training needed when initiating a culture change project.

When a quality management system is introduced to an organization, obviously training programs of the category described in the last of the above bullets are needed. The role of these training programs is of significant importance, because through their implementation people are prepared to see the changed situation in a positive way for the organization and, ultimately, for themselves.

Due to the importance of the role of training when a quality management system is implemented in an organization, the opinion of the thesis author is that the relevant training programs should be carried out before any system design activity or change takes place. By this way, people get systematically and correctly informed about the whole situation and misunderstandings that often appear are avoided. The thesis author, as a quality director in SME A started the quality management system implementation project by training all personnel. Her previous experience of quality management systems implementation projects had shown that when personnel training was carried out in the middle of the project, its results were poor, because people had already expressed their resistance to the changing situation, without having been informed about the content of that change.

As the data collection procedure showed, in case of SME D, training in the area of quality management and of ISO 9000 standards was inadequate and carried out neither

in the correct time, nor in a systematic way. This situation influenced negatively the overall quality management system implementation project, as people were not properly prepared to realize its content and, inevitably, could not be convinced about its worth for them and for the organization.

Examining furthermore the issues of training, Bounds [18] refers to the way a world-wide wire producing organization dealt with the focused training activities when a quality management system was implemented: a selection of a team from more than one organizational levels for attending a training program took place and radical results of training were achieved. This training approach reflects the empowerment of team work and a tendency to lean management structures.

Continuous and focused training activities contribute to people empowerment and commitment. As Wong [22] points out, staff cannot be forced by managers to become empowered, committed or excellent. The latter should create the conditions which will either inspire or frustrate. According to the thesis author's opinion, properly designed training is a very important element of the conditions that inspire and empower people, making them committed to organizational values and objectives.

Referring to the job-specific training activities, Macdonald [23] views that better trainers are people who belong to the organization and especially the managers or supervisors. The closer the relationship between trainer and trainee is, the more impressive the results of job-specific training are. The same author underlines that a period of «practice» must always follow the job-specific training, for achieving sustained results.

The ISO 9001:2000 standard, referring to the management of **other resources** (subclause 6.3), takes under consideration: information, infrastructure and work environment.

Management of information, from the point of view of SMEs is an important issue, since information flow is not adequately controlled and this situation can be even dangerous. In terms of integration, such an issue becomes even more significant.

Management of infrastructure and work environment depends on the particular SME and can be facilitated by adequate planning.

The ISO 9004:2000 standard includes **financial resources** to those that should be managed for the implementation and maintenance of the quality management system. It also underlines that the effectiveness and the efficiency of the quality management system can influence the financial results of the organization:

- internally, such as reduced error and waste
- externally, such as enhanced customer satisfaction

By incorporating to the internal influence of the financial results of an organization, issues like:

- loss control (see 2.2.3)

- cost of environmental non-compliance (see 2.2.4)
- improved management of the material supply chain (see 2.2.4)

and to the external influence of the financial results of an organization, issues like:

- improvement of the organization's image in society
- satisfaction of all interested parties,

it can be seen that the relationship between a management system integrating quality, safety and environmental issues and the financial resources of an organization is very close and has to be monitored. This fact applies specifically to SMEs.

The element of **process management** (clause 7 of the ISO 9001:2000 standard) incorporates all the operational activities of an organization. The standard includes general requirements for the way processes should be managed and refers to the fact that the organization determines which processes are required to operate as a loop, by considering the outputs from the quality planning process.

Processes are divided by the standard to the following categories:

- Customer related processes
- Design and development
- Purchasing
- Production and service operation
- Control of non-conformity
- Post delivery services.

A thing that should be underlined in this point is the fact that the standard, through the way that it categorizes the processes and also through the areas of concern outlined in each process category, offers a suitable platform for integrating safety and environmental issue. Each process category covers and operational field of the organization that can be focused through quality, safety and environmental concepts, principles and requirements. Integration has to be based on a process-thinking approach, since the way processes are managed is determined by their dependence on the integrated management system parameters.

Renfrew *et al* [24] introduce an approach for integration of individual quality, safety and environmental management systems based on the Quality Management Process Model of the ISO 9001:2000 standard, looking at processes from a high, medium and low risk rating, as well as from a core, support and assurance viewpoint. This approach related to the process dependence on the integrated management systems parameters mentioned before.

In relation to process management, the ISO 9004:2000 standard makes a reference to assigning **process ownership** of key processes to individuals or groups who will have the overall responsibility for the output of the process. Such arrangement is considered to be helpful to SMEs where the delegation of responsibilities and authorities is not

carried out in an adequate and efficient way and conflicts occur quite often. This issue is also discussed in paragraph 2.4.

The element of **measurement, analysis and improvement** (clause 8 of the ISO 9001:2000 standard) includes a range of processes for measuring operational performance and demonstrating that the product and / or service conforms to specified requirements.

Measurement (subclause 8.2 of the ISO 9001:2000 standard) refers to:

- system performance, to which a primary measure is customer satisfaction, as it is also underlined by Champy [25], and it is determined by internal audits from the aspect of the organization
- processes
- product and / or service
- control of measuring, inspection and test equipment.

Analysis (subclause 8.3 of the ISO 9001:2000 standard) determines where quality management improvements can be made and is carried out through the implementation of statistical techniques.

The data collection procedure did not show inadequate performance of SMEs in the area of measurement activities, but this did not happen in the area of analysis; it was shown that SMEs do not analyze data collected through measurements for determining core improvement activities. A possible reason for that is their inadequate knowledge and competencies in that area.

Improvement (subclause 8.4 of the ISO 9001:2000 standard) is based on corrective action and continual improvement process.

The way that the ISO 9001:2000 standard approaches measurement, analysis and improvement is as much generic as needed for integrating safety and environmental parameters.

The implementation of a quality management system is always a **change process** for an organization. If this implementation acts as a platform for management integration, the change is deeper and wider. The thesis author believes that some issues related to such change should be addressed.

Norris [26] uses the phrase “the pain of change”. This phrase describes the process of change as a painful process, which is true since, people are the crucial parameter of a change process and resistance to change is a fundamental principle of management, according to Bird *et al* [27]. The data collection procedure showed that employee resistance occurs during the implementation of a quality management system to SMEs.

Lowenthal [28] refers to the fact of employee resistance to organizational change and views that a successful change effort must begin by changing employee attitudes which leads to change in individual behaviour.

Chevalier [29] underlines that most change programs do not work as well as they were supposed to, because they are guided by theoretical approaches of people, organizations and change implementation, which are too exclusive, thus are unable to cope with differences and antipodal requirements. She also refers to the fact that organizations where quality programs are successful, appear a hybrid organizations which means that they combine very different aspects usually presented as contradictory.

Duck [30] focuses on managing the emotional connections that are essential for any transformation.

The importance of the above viewpoints relies on the following points:

- unless the human parameter is taken under consideration, improvement efforts that cause change cannot succeed
- during a change process, flexibility and management of opposite forces are imperative for success.

These points are critical for the implementation of an integrated management system, since changes take place throughout the overall organization.

Duck [30] insists on the significance of informing people from the beginning and during a change process, because informal conversations, rumors and gossip tend to fill information vacuums, creating a negative atmosphere, dangerous for the success of the process. Considering the high level of communication informality that characterizes the SMEs, this issue becomes even more important. Also Heracleous [31] points out that, in organizations, there is an insatiable need for information at times of change. Training activities carried out in the beginning of a change process, combined with a systematic and controlled flow of sound information during all stages of the process facilitate its progress and fulfillment.

According to Lowenthal [28], the three (3) interrelated factors that are needed to change an organization effectively are: coordination, commitment and competencies. Hammer [32] emphasizes the importance of the leader to be even fanatically committed to change, in agreement with Hammer and Staton [33] who, outlining the requirements for leadership in a change process, refer to passion, ability to inspire trust and confidence and combination of impatience and patience.

Obviously, the role of leadership in relation to the aspect of change caused by the implementation of a quality management system or, moreover, an integrated management system, is of prime importance.

2.2.3 Safety Management

Moving to the 21st century, the occupational health and safety issues become more and more significant for all types and sizes of organizations. The most profound reasons are the following:

- legal and other obligatory regulations address to them
- they affect the cost - efficiency of the organization
- they are related, directly or indirectly, to the benefits of all interested parties (customers, employees, suppliers, owners, society).

As Bird *et al* [27] describe, the integration of safety into a professional management system took place step by step, starting from the mid-1900's (from forties to sixties). This evolution was based on the movement from the conviction that the basic causes of most accidents are within the control of workers, to the conviction that these causes can be controlled only by management. In other words, the development of safety management has been based on the transition from the viewpoint that safety is a technical field to confront, to the management system approach of this issue.

This transition seems to have been neither easy, nor quick. Weinstein [34], in an analysis of how Total Quality Management concepts can be adapted to safety management, explains why traditional safety programs fail to improve employee safety, based on data from these programs implementation to organizations during the period between 1989 and 1993 (according to Connecticut Dept. of Labor statistics):

- a. they are too focused on technical requirements and short term issues
- b. they are isolated in small groups, so different types of hazards are managed by different staff, under different technical disciplines and using different analysis techniques
- c. they are not integrated organization-wide.

Referring to point c, the need of the transition mentioned above, is underlined by Simon *et al* [35], through their opinion that health, safety and environmental functions should be redesigned, based on a combination of «strategic» and «systems» thinking. They refer also to the fact that this approach probably faces strong resistance from the traditional safety culture that considers engineering to be the only way to prevent accidents in industry.

Hansen [36] considers that traditional safety programs fail to achieve their objectives because the issue of safety is not integrated throughout the organization.

The viewpoints mentioned above actually result to the fact that unless a «systems» approach is adopted, safety programs are proved inefficient and can lead only to short-range results.

Adopting a «systems» approach first of all means that safety should be an element of an overall management system of an organization. The development and introduction of the BS 8800:1996 standard: «Guide to occupational health and safety management systems» provides an established framework for adopting such an approach in the area of safety. The guidelines provided by the BS 8800:1996 standard are presented through two (2) alternative approaches: one based on the HS(G) 65 model approach and another based on the ISO 14001:1996 standard approach. According to the

objectives of this research project (see paragraph 0.2) the second approach is going to be used.

The BS 8800:1996 standard elements of successful health and safety management based on the approach of ISO 14001:1996 standard are the following:

- **Initial status review**
- **Occupational health and safety policy**
- **Planning**
- **Implementation and operation**
- **Checking and corrective action**
- **Management review,**

in a continual improvement looping relationship (see figure 3/2).

Various sources of literature converge to the fact that safety should be considered as a critical parameter of the organization's overall management strategy and implementation.

Etherington [37] views that in today's extremely competitive global economy, the need of excellence in safety management is an economic reality and this fact leads safety management from business edge to business core. Also Gregory [38] insists on the fact that safety and health issues are an integral part of other business functions such as quality, cost control and production and this can be conversely justified by the fact that the fundamental root causes of accidents are also root causes of other management and operation problems. Johnson *et al* [39], reviewing the annual direct cost of accidents in New Zealand (about \$ 520 million) and also calculating the annual indirect cost of them (about \$ 2.6 billion), based on the hypothesis that a ratio of one to five direct to indirect cost stands, believe that not only the direct cost but the indirect cost of accidents should as well be considered in major business decisions.

The cost of a low performance safety management system can be better illustrated and more accurately evaluated through the concept of «loss». According to Bird *et al* [27], the result of an accident is loss and the most obvious losses are harm to people, property or process, but implied and important related losses are these of performance interruption and profit reduction. So losses can involve people, property, process and, ultimately, profit.

The opinion of the thesis author is that the adoption of the «loss» concept to safety management systems is useful and purposeful, because:

- it is a realistic approach that can convince the top management of any organization to actually get involved to safety issues
- it is the most spherical way to manage these issues
- it leads to control methods that integrate many functional options of an organization

However, the principles and sound management practices of the ISO 9000 quality management standards (as they are being modified for the 2000 edition) and of the

Business Excellence Model, that are adopted in the research project, extend the concept of loss to the field of the entire society. Ineffective safety management system has a direct or indirect impact to the overall external environment of the organization, leading to additional loss and the relevant cost for the latter.

Conclusively, the concept of loss is considered to addresses to people, property, process and society. It must be noted that the concept of loss is related also to environmental management (see 2.2.4).

To create the background for a continual cost-effective performance improvement of the safety management system and loss control, an organization should first of all carry out an **initial status review**, according to the BS 8800:1996 standard. The initial status review aims at monitoring the current situation of the organization, in reference to the occupational health and safety management system and providing a baseline from which progress can be measured. The results of the initial status review provide input necessary for the safety policy determination.

Before proceeding to the issue of safety policy, the **role of leadership** has to be examined. Literature references converge to the fact that the top management of an organization plays the most crucial role to the overall performance of a safety management system, even to the existence of it.

Synnett [40] proposes a number of key strategies for a successful safety management system and, ultimately, all of them depend on the top management commitment (which is, of course, the first key strategy described). Real top management commitment has to be communicated to all other leaders of the organization and demonstrated to the whole organization. The best way of this demonstration is by giving an example of a behaviour that is in a sequence with a safety oriented organizational culture. Also the BS 8800:1996 standard refers to the necessity of senior management to demonstrate by example their commitment to the continual improvement of occupational health and safety performance (clause 4.3.1). Simon *et al* [35] emphasize on the fact that for redesign the safety functions of an organization, a culture change is essential, and this cannot be accomplished unless the senior management of the organization really wants it and supports it. Johnson *et al* [39] underline that CEOs should never stop being personally involved in the safety management system and should focus in being kept informed about the accidents and the incidents that happen to the organization, because they hold the overall responsibility for health and safety, even if they have delegated the role.

The introduction of a safety management system has to be supported and inspired by the top of the organizational structure, as it happens also with quality management. The establishment of a **safety policy** and a relevant set of objectives and targets is the fundamental step. According to the BS 8800:1996 standard, the establishment of an occupational health and safety policy should be documented and endorsed by the most senior management.

As Dave [41] defines, a policy statement is a communication tool used by management to direct the activities of all employees to achieve a particular goal. This definition is very close to the ISO 8402:1994 definition for quality policy (clause 3.1): « Overall

intentions and direction of an organization with regard to quality, as formally expressed by top management».

The need for the policy to be documented, or «formally expressed» according to ISO 8402:1994 is of great importance for all organizations. Dave [41] expresses the opinion that a written policy statement may not be necessary for small organizations, as there may exist more frequent informal communication through personal contacts. The thesis author disagrees with that opinion because:

- Informal communication paths, though they can be turned to advantage in a small organization, they may lead to problems, such as failure in key individuals information mechanism, failure in issues coming to surface and difficulty in handling disciplinary matters, as it is defined in the “Small Business Interpretation of Business Excellence Model” [5], if these paths are not supported by a system of formal communication, suitable for the size of the organization. Additionally, in case of a management system policy, individuals interpretations of an oral announcement may result to misguiding employees, especially those of the lower levels of the organizational structure.
- The analysis of the data collected from thirteen (13) SMEs showed that written statements from management (not only from the top management) always influence employees; they attract their attention and make them feel more responsible of achieving targets or participating to activities, according to what they have read. A real example of the thesis author’s experience as a quality director in SME A enforces this result: when a piece of paper with the quality policy statement was stuck on five (5) selected points in the plant and in the main building where the administration offices are located, about the 80 % of workers and employees read it during the first day of its presence. Some of them saw it by themselves and they immediately informed their colleagues. The next day almost everybody was talking about the content of the statement and posed questions to their supervisors, to the quality director, even to the director general. These questions were more or less similar, for everybody **had read the same thing**. Of course, in the beginning each individual interpreted what he had read in his own way, but it was assured that the basis was common. In this example it can be seen that informal communication paths assisted the quick flow of the new idea within the organization, but this new idea was based on a defined reference.
- A written safety policy statement gives the organization the opportunity to demonstrate its commitment to safety to external parties, and this is useful for all sizes of organizations.

Going back to Dave’s article [41], he underlines that the preparation of a safety policy statement should truly express top management’s view and not be a composition of parts of ready-to-use policy statements. This is a very important remark, as the analysis of the data collected from all three types of sources (SMEs - consultants - Certification Bodies) showed that very often top management of organizations (even of some big ones) fail to realize the significance of a policy statement and just modify statements used by other organizations, usually indicated to them by consultants. This point has been observed in quality policy statements, where, sometimes, a line or two are dedicated to typically express the management concern about the occupational safety and health of employees. Dave [41], giving guidance to organizations of how to

prepare their safety policy statement, indicates three (3) components which the statement should be based on:

1. The expression of top management's both humanitarian and business concern about the occupational health and safety issues.
2. The definition of direction that sets the tone for the development of the safety management program.
3. The definitions of the responsibilities of individuals at all organizational levels in relation to the safety management system.

The component described in point 1 reflects a realistic approach of top management's expectations from a safety management system. The humanitarian and business aspects, which can be both expressed by the phrase «minimization of losses», should be communicated to employees as an integrated organizational objective. The components of points 2 and 3 refer to the overall framework for the safety management system development.

The BS 8800:1996 standard presents a list of what the occupational health and safety policy should include. This list focuses on the management commitment to the following topics:

- a. the integration of occupational health and safety issues to the overall business performance
- b. the compliance of occupational health and safety performance to legal requirements as the minimum and the continual cost-effective improvement of this performance
- c. the provision of adequate and appropriate resources for the implementation of the policy
- d. the setting and publishing of occupational health and safety objectives
- e. the placement of occupational health and safety management responsibilities as a prime responsibility of all levels of line management
- f. effective communication of the policy to ensure its understanding, implementation and maintenance at all levels in the organization
- g. enhancement of employee involvement to gain commitment to policy and its implementation
- h. periodic review of the policy, the management system and audit of compliance to policy
- i. provision of appropriate training to employees of all levels for being competent to carry out their duties and responsibilities.

Each of these topics actually represents a principle of the occupational health and safety management system.

Referring to topic b, it must be noted that **the compliance to legal requirements** which should be considered as the minimum, was found to be the unique concern of all thirteen (13) SMEs included in the data collection procedure. In addition to that, none of the eight (8) consultants interviewed had been ever asked by an SME for help or guidance in the area of safety and the representatives of two (2) of the three (3) Certification Bodies that were included in the data collection procedure noticed that the organizations exhibiting a more satisfactory performance in safety matters (as they

can see through the ISO 9000 quality management system assessment audits) are these carrying out hazardous activities, where occupational health and safety legislation is particularly extensive.

This, limited to legal requirements borders, SMEs approach to safety management is a reality that is also recognized by the BS 8800:1996 standard; in its introductory comments it is clarified that small organizations first need to ensure that they meet legal requirements before aiming for continual improvement over time. The basic reasons for this being a reality are related to the SMEs special characteristics and needs as they are presented in paragraph 2.1.

In the literature reviewed, some references to the issues of occupational health and safety management system compliance to legal requirements were found. Simon *et al* [35], note that governments, responding to constituencies, demand safer workplaces and a cleaner environment and this is one of the reasons for the need of health, safety and environmental functions to be redesigned. They include legal requirements, together with customers, stockholders, marketplace and workers' compensations issues, in the term «environmental demands». Environmental demands are continuously changing, directly influencing the health, safety and environmental management system of an organization that has to be adjusted to these changes.

Regarding the issue of workers' compensations, which are relevant to both cost-efficiency of the system and legal requirements, Synnett [40] considers that the effective management of this issue is one of the key strategies for a successful safety management system. As inactive open claims are usually turn into expensive claims, he insists on the need of appropriate in-house management claims review and quick response especially to serious claims. The adoption of a «partnership approach» to these issues (including activities like quick personal contact of management with the injured employee and quick return to injured employee to work) often leads to better overall safety management performance.

Based on the results of the initial status review and the determination of the safety policy, the top management sets **occupational health and safety objectives**, addressed to all levels of the organizational structure. Gregory [38] proposes these objectives to be developed through mutual agreement between levels of management. Surely, mutual agreement between those who set the occupational health and safety objectives and those who have the responsibility of achieving them is the best way for assuring the achievement of the objectives. But employees would never consciously participate to that process unless:

- they are convinced that the achievement of these objectives benefits themselves and all other interested parties
- they know that the achievement of the objectives will be acknowledged by their supervisors
- the organization provides to them adequate resources for achieving the objectives

First of all, the inner concept of an objective and the way that this concept is evaluated by an individual are the critical factors for the individual to be **convinced** that the objective is worthy of their effort and commitment. Jarzembki [42], enlightening the

philosophical side of safety management, expresses the opinion that people are much more likely to adhere to rules with which they agree. This opinion results to the need for the development of a safety culture among all levels of employees within an organization. Such thing can be achieved through the following ways:

- communication and awareness
- enhancement of employee involvement
- training and motivation

Weymueller [43] views that dissemination of safety information and safety sessions held by managers consolidate efforts for **communication** improvement. He supports that the attendance of safety sessions should be limited to employees doing the same type of work and safety matters related to their job should be presented. The thesis author disagrees with that opinion, as such attendees exclusivity limits the power of safety sessions as communication tools within a certain group of people. Additionally, in Annex B of the BS 8800:1996 standard, where guidance is provided on the allocation of responsibilities and the organization of people, resources, communications and documentation, it is clarified that communication and cooperation should be within and between different functions in the organization, because significant differences often exist between different parts of it and employees should be aware of the overall safety issues in the organization.

Jarvis [44] refers to the role of health and safety committees (which have been risen through health and safety legislation), considering them as an essential component of management and staff communications. He also refers to the fact that many companies complement the health and safety committees with a new management team («steering or action group»). Weymueller [43] believes that health and safety committees benefit the firm and its employees, offering a good way to bring workers into a safety program.

The data collection procedure of the research project resulted to the fact that the health and safety committees of all thirteen (13) SMEs are more or less inactivated and they just carry out typical things to comply to the legal requirements (e.g. participating to meetings with the management every three months where mostly superficial discussions were taking place, except from specific occasions when an urgent problem must find a solution). Practically, the health and safety committees were found to be oriented to syndicalism, rather than examining health and safety issues and enforcing both employees and management to help improving the organizational performance towards these issues. Based on the SMEs special characteristics and needs as they are presented in paragraph 2.1, it can be realized that, as complementary management teams cannot be easily established in these enterprises, activation and fruitful utilization of the health and safety committees will be a significant contribution to the efforts of communication and awareness development and this can be driven by top management.

Etherington [37] views that a team based approach of safety management system promotes employees **awareness**, because it gives them responsibility for everything, from productivity and quality issues to managing safety. Actually, this approach facilitates also the enhancement of **employee involvement**, which is a crucial factor

for the achievement of safety management objectives and for the continual improvement of the performance of the safety management system.

Cross-functional working teams and motivation for participation in the area of safety management have a positive influence in employee involvement efforts. Kincaid [45] proposes to safety managers to «solicit» participation from employees and to reward them if they do so. Thorburn [46] supports that in safety audits which are in the core of monitoring performance activities and an important tool for achieving continual improvement, all the employees of an organization must participate in a year-round. Bird *et al* [1] advise that in safety inspections carried out by the front line supervisors, other employees from middle and upper management must participate. Gregory [38] believes that establishing, in a participative fashion, safety and health responsibilities for all levels involved (management and non-management employees) is the first step for the development of a successful safety management system.

Awareness and employee involvement cannot be developed without providing the appropriate training to all levels of an organization. The BS 8800:1996 standard directly refers to the necessity of identifying competencies at all levels within the organization and organizing the relevant training. In Annex B of this standard, special guidance is provided for the occupational health and safety management system requirements and the organizational training programs.

The necessity of training may have to be considered beginning from the top management level and this is even more critical in cases of SMEs (see paragraph 2.1). Hansen [36], in his analysis of failings of traditional safety programs, refers to management's lack of knowledge regarding quality and safety improvement techniques.

According to Weymueller [43], safety training starts from the first day at work. New hired people should be impressed with the need of safety consciousness as soon as possible. This point is quite important, because through this way a good start is made and the process of developing a safety culture to the new employee is facilitated. Additionally, the author refers to the fact that safety training must start by the supervisor of the new employee. This fact is underlined also by Synnett [40] who views that it is important supervisors address safety and risk management personally with new employees, who usually define safety commitment as what their supervisor says and does.

Safety training should start from the new employee's first day but it has to be a continuous process. According to the thesis author's opinion, safety training should be integrated to the job training that an organization provides to employees. As safety, like quality, has to be a basic element in all operational or business processes, training on this element cannot be separated from the actual job training that an employee receives. Surely, the role of supervisors is of great importance.

Motivation of employees is a continuous human resources management process, that works both as an initial spark and as a «feedback mechanism» for employees involvement and performance improvement.

Gregory [38] proposes specific motivational tools for safety and health, among which the following three (3) are quite useful and considered to be applicable in SMEs:

- Worker safety analysis, a procedure designed to identify individual attitudes that may affect behaviour on the job. This procedure can be implemented in an SME, as people know each other much better than it happens in a large organization and supervisors can quickly profile their people and help them properly modify their behaviours for accidents or problems prevention and also find out the best way for motivating them.
- Climate analysis, a technique for assessing the employees perception of the plant's safety and health environment. In an SME, this can be identified even after an informal walk of a management representative through the plant when some short conversations with people can give adequate information on this point. Such information can be analyzed and probably result to a need of changing this climate and motivating people accordingly.
- Positive reinforcement, the act of rewarding people for their actions in order to encourage the recurrence of the behaviour. The reward can be money, status, promotion, personal praise or anything that can make people feel that their efforts and achievements in the field of safety management have been acknowledged.

The **acknowledgment** of the safety objectives achievement is the of great importance for employees. If employees know that this acknowledgment is a component of the safety management system, they are much more willing to be committed in achieving agreed objectives.

Synnett [40] includes the establishment of safety awards and recognition programs in the key strategies for a successful safety management system. Such programs should be focused on personnel that can influence the behaviour of many other employees such as front-line supervisory staff and management and should be based on a cross-function team environment.

Enabling employees to agree on safety objectives, the organization has to provide them adequate resources for the achievement of these objectives. As the issue of resources provision is always a point for SMEs, it cannot be faced unless proper planning takes place.

Planning, according to the BS 8800:1996 standard involves identification of occupational health and safety requirements and setting clear performance criteria defining what is to be done, who is responsible, when is to be done and the desired outcome. The following key areas should be addressed:

- Risk assessment, including identification of hazards
- Identification of legal and other requirements
- Specific planning arrangements to cover key areas like personnel, resources, occupational health and safety knowledge, skills and experience, risk controlling, operational control activities, performance measurement, corrective actions and their implementation, audit, management review activities.

Risk Assessment is defined as the overall process for estimating the magnitude of risk and deciding whether or not the risk is tolerable or acceptable (BS 8800:1996, clause 3.14). Hazard identification is defined as the process of recognizing that a hazard exists and defining its characteristics (BS 8800:1996, clause 3.5).

The risk assessment process is a legal duty of all employers and self employed people. The way that this assessment is implemented should be cost-effective and tailored to the nature and the complexity of the organization's activities. According to the BS 8800:1996 standard, sophisticated methods and quantified risk assessment are normally only required where the consequences of failure could be catastrophic. In most organizations simpler subjective methods are appropriate.

Nevertheless, the size of the organization may not play a determinative role for the process of risk assessment, as it does not always influence the operational activities.

Jarvis [44] believes that an organization should directly involve as much employees as possible in the risk assessment process, for improving the level of their awareness of health and safety issues.

The BS 8800:1996 standard proposes the following sequence of steps for carrying out the risk assessment process:

- a. Classify work activities
- b. Identify hazards
- c. Determine risk
- d. Decide if risk is tolerable
- e. Prepare risk control action plan (if necessary)
- f. Review adequacy of action plan

In agreement to the point a: Classify work activities, Bird *et al* [27] refer to the job/task analysis as a critical planning activity for the health and safety of the organization. This analysis results to procedures for a step-by-step description of «how to proceed» from start to finish in performing a task properly and safely. The phases of this analysis are the following:

- Inventory the tasks for each occupation or job title
- Identify the critical tasks according to:
 - ⇒ the severity of any potential loss
 - ⇒ how frequently the task is performed
 - ⇒ the probability of any loss when the task is performed
- Break work into steps or activities
- Identify loss exposures for each significant step
- Make an efficiency check
- Develop controls
- Write a task procedure
- Put to work
- Update and maintain records

This process can be expanded by integrating quality and environmental issues and can lead, if combined properly, to integrated task instructions attached to integrated job descriptions.

When identifying hazards (point b), according to the BS 8800:1996 standard, broad categories of hazards should be defined and a tailor-made prompt-list of questions related to the existence or not of various hazards should be used. Rotter [47] proposes the use of the technique of area classification as a delineation of space that poses a potential hazard in a plant or operational unit. Area classification could be a complementary technique in the process of identifying hazards and could also include environmental aspects. The designation of areas may be helpful during carrying out the process or even longer, depending on the overall safety management plan.

When determining risk (point c), according to the BS 8800:1996 standard, a subjective estimation of risk associated with each hazard should be made, assuming that planned or existing controls are in place. The effectiveness of the controls and the consequence of their failure should also be considered. Johnson *et al* [39] refer to the fact that the safety risk management must consider the overall business consequences of accidents.

For deciding if a risk is tolerable or not (point d), criteria should be established and also a kind of rating system for risks. What is quite important is the way that an organization deals with the information produced by these steps of risk assessment, as Jarvis [44] indicates. When preparing the risk control action plan (point e), priorities should be balanced against investments and this is an issue of crucial importance for SMEs). It could be said that there is a potential risk in any activity, so the starting point is to bring risk within acceptable levels and to press for risk avoidance or reduction. Another point underlined by the author is that there are many cases that vast quantities of equipment have been purchased within the framework of a risk control action plan, when a simple reorganization of existing arrangements would have sufficed. This observation is true and leads to the proactive concept of safety «by design».

Johnson *et al* [39] believe that safety must be built to all decisions taken within the organization: selecting employees, buying machinery or hiring a new general manager. Considering this opinion in cases of SMEs, it is quite clear that this way of thinking addresses to their need for cost-effectiveness and contributes to minimization of risk. The extent of this contribution depends on how much early the concept of safety «by design» has been implemented to the organization's decision-making system.

Risk assessment is a continuous process that affects the safety management system loop (see figure 3/2) and the risk control action plan has to be reviewed for its implementation and effectiveness, taking under consideration any changes taking place.

For legal and other requirements that should be analyzed when planning for occupational health and safety, an accurate information flow mechanism is needed to assure the validity of the issues applied in the organization and that the latter is aware of any changes in a continual basis.

Implementation and operation follow the planning phase according to the BS 8800:1996 standard and include the delegation of responsibilities for health and safety. The allocation of an individual from the most senior management level to have a particular responsibility for the proper implementation of the occupational health and safety management system is indicated as the best practice.

The documentation of the occupational health and safety management system and the control of this documentation are key elements, as it happens in any management system. Craddock [48] views that the document control needs to be established early in the implementation of a management system because later on, the documentation becomes more difficult to control. This point is also discussed in paragraph 2.1, because of a relative result of the data collected from representatives of Certification Bodies. Safety management system documentation may start to be built on the documentation of a quality system that is already in place within an organization. It must be said that solely this activity should not be considered as a management systems integration.

According to the BS 8800:1996 standard, an organization should make arrangements to establish contingency plans for foreseeable **emergencies** and to mitigate their effects, within the framework of implementation and operation activities. The development of such plans lead to better loss control in cases of emergency, as the whole potential of the organization is focused on designed activities that, in synergy, can mitigate the extend of loss.

As the dynamic element of management systems is the process of continual performance improvement, **measuring performance activities and audits** provide the appropriate feedback for all elements of the occupational health and safety management. Weiler *et al* [49] underline the need for the establishment of a process to identify, capture and report business benefits resulting from the implementation of an environmental health and safety management system.

Actually this is a critical point for the success of these systems: if benefits are not measured and monitored, two (2) kinds of problems will occur:

- The worth of the system will be underestimated. Especially in case of SMEs, where the compliance to legal requirements may be the only imperative that is recognized by top management as a reason to introduce a safety management system, unless the benefits of the system are monitored, the top management may not be able to evaluate its contribution to the overall performance of the organization.
- The process of continuous improvement will be held back, as no feedback will be available to use for assessing the performance and reset the performance objectives.

Olajire [50] looks at the costs of unsafe environment and examines how to convert these costs to profit. He lists the consequences of failing to have an effective safety program from the aspect of cost. Based on a systems approach, he applies a productivity model (the American Productivity and Quality Centre Model), as a diagnostic tool to a safety program. For implementing this, there are many elements that an organization has to calculate in detail and that usually cannot be or are not

calculated by SMEs. The overall procedure is too complicated for an SME, especially when the SME is in the beginning of such an effort, but the concept of relating the safety management to productivity improvement is very indicating for the significance of safety management, that can be continuously increased as the system matures.

As the BS 8800:1996 standard defines, safety performance measurement is a means of monitoring the extent to which policy and objectives are being met and includes:

- ⇒ proactive measures of performance that monitor compliance, for example through surveillance and inspections, with the occupational health and safety arrangements, for example safe systems of work etc.
- ⇒ reactive measurements of performance that monitor accidents, near misses, ill-health, incidents and other historical evidence of deficient health and safety performance

According to the standard, appropriate outcome quantitative and qualitative indicators should be selected, depending on the chosen objectives.

Referring to safety inspections, Bird *et al* [27] present two (2) broad categories:

- informal inspections, that are carried out as people go about their regular activities,
- planned inspections, that may be:
 - general inspections, meaning a planned walk-through of an entire area during which a comprehensive look is taken at everything, to search out loss exposures (including housekeeping)
 - critical parts / items inspections, which are focused on the components of machinery and equipment, materials, structures and areas likely to result in major problem or loss when worn, damaged, abused, misused or improperly applied.

The thesis author experienced the worth of safety general inspections as a quality director in SME A. During these inspections, which were carried out by her and the person who typically had the responsibility of safety issues, many loss exposures were identified (most of which were related to inadequate housekeeping), that would not have been identified in a different way.

According to the thesis author's opinion, in SMEs safety informal and general inspections should be carried out periodically by top management, as a means of demonstrating their commitment and providing communication. It is quite obvious that the presence of the top management in a safety inspection enhances its potency and upgrades it as a proactive measurement tool.

Thoburn [46], referring to a case study of DuPont Canada's Mailand facility, describes that regular safety inspections were conducted by operating and maintenance personnel. This is a very effective approach as these employees know the core elements of the operational processes and the machinery use and can give a more spherical yet meticulous option to these inspections.

Goldberg [51] focuses on accidents investigations and describes a three-phase process for carrying out such an investigation, insisting on the fact that all accidents should be investigated:

- examination of initial response
- collection of evidence and information
- analysis and correction

These phases outline a generic accidents investigation method that can be applied in SMEs. It was identified through data collection procedure that the process of accidents investigation is very rarely implemented in the examined SMEs and only in cases of serious accidents. But even in these cases the process is not carried out in a systematic way and the results for the accident causes may be superficial.

A serious obstacle in the accident / incident identification process has to do with the fact that people very often do not report all accidents / incidents. Bird *et al* [27] list a number of reasons for this phenomenon, the most important of which are the fear of any kind of consequences, the concern about the attitudes of others and the lack of understanding of the importance of complete reporting. Communication, training and positive reaction to timely reporting can help this situation. Especially in cases of incidents, people must become aware of the impact of incidents in the overall safety performance of the organization. The 1-10-30-600 ratio (resulted from a study of industrial accidents carried out in 1969 by the Insurance Company of North America), presented by Bird *et al* [27] could be an effective way of making people realize the significance of incidents, as for each serious or major injury, ten (10) minor injuries are reported, thirty (30) property damage accidents and six hundred (600) with no visible injury or damage.

Periodic safety audits enable a deeper and more critical appraisal of all the elements of the occupational health and safety system, according to the BS 8800:1996 standard. The concept of these audits is common with that of quality audits described in the ISO 9001:2000 standard. Weiler *et al* [49] make a distinction between pure compliance audits that only allow a verification that the organization has performed and is currently performing in an acceptable manner those elements being audited without providing assurance of future acceptable performance and the system auditing approach which provides assurance of future acceptable environmental, health and safety functioning by verifying that the systems which are necessary for continued appropriate and improving performance are in place. Craddock [48], describing a case study for an SME that used the experience of an already established quality management system to set up a health and safety system, refers to the development of a scored audit protocol for tracking improvement. This approach has the advantage of giving quantitative results but questions could be raised about its flexibility towards the inevitable changes of the system.

The audits should have a dynamic inclination and address all aspects of the safety management system. According to the BS 8800:1996 standard, the findings of audits, together with the overall performance of occupational health and safety system, the performance of individual elements of the system and the internal and external factors

are the points that are taken under consideration during **management review**. The management review is essential for the continuous improvement loop of the system, where actions necessary to remedy any deficiencies are determined. Management reviews take place periodically and aim at overlooking the performance of the safety management system and assessing its structure towards changing internal and external environment parameters.

The BS 8800:1996 standard is not a standard for a third party certification. It provides guidance for developing and implementing an occupational health and safety management system, in consistency with the ISO 9001:1994 and ISO 14001:1996 standards. Hansen, Mark [52] concludes that it is uncertain whether an ISO occupational health and safety management systems standard will be developed, based on the movements that have taken place between the relevant interested parties. Certified or not, a safety management system, integrated within an overall management system, is a critical factor for SMEs performance improvement, for:

- it provides a systematic way of continuously complying to legal and other requirements
- it contributes to the continual improvement of the organization's cost-effectiveness, while improving the satisfaction rate of all interested parties.

2.2.4 Environmental Management

Environmental impacts of all kinds of business activities have been increased, in relation to their extent and severity, as a function of the evolution of technology and the global economic development. For many decades, environment had been an issues of secondary importance, due to the following facts:

- the results of environmental impacts had not been accumulated yet
- resources had not begun to shrink
- the cost of environmental non-compliance had not started to be calculated
- legislation and other obligatory regulations either did not exist or were too loose to influence the situation.

Organizations focused their efforts on increasing productivity, as the only way to improve profitability. Research and development activities did not take under consideration the environmental aspects of a product design and development project, in relation to the selection of raw materials and packaging materials, the production method, the energy consumption and the life-cycle of the product and its packaging.

As soon as the first signals of the arising problem were received, governments and international organizations, also pressed by numerous social forces, began to try to put barriers to the situation which seemed to be out of control. The initial approach of these barriers was the implementation of **pollution prevention** activities.

Fiskel [53] characterizes pollution prevention activities as the first wave in voluntary proactive environmental management and outlines four (4) major categories of pollution prevention:

1. Good housekeeping practices, which ensure that resources are used efficiently and that preventable material losses are not occurring.
2. Chemical substitution, which reduces or eliminates the presence of undesirable substances, such as heavy metals, carcinogens etc.
3. Manufacturing process changes that simplify production technologies, reduce process emissions, or introduce closed-loop recycling.
4. Resource recovery that captures waste materials and reuses them as inputs to other manufacturing processes or for secondary applications.

The author underlines that pollution prevention, by its nature, can produce only marginal improvements, because by the time it is initiated, the investments in capital equipment have already been made and the basic process parameters are already established.

Obviously this is true, considering the four (4) categories of pollution prevention which are mentioned above; each one of them describes arrangements that reduce, in one way or another, the environmental impact of business activities, without changing the basic framework within which these activities take place and without introducing any systematic mechanism for evaluating performance improvement benefiting both the environment and the organization.

The need for developing a systematic approach of dealing with environmental impacts of business activities, gradually became an imperative, due to:

- inadequate results of isolated pollution prevention activities and plainly technical environmental protection methods, compared with the cost of relevant investments in technology and equipment
- issues of cost-effectiveness that should be taken under consideration in every organizational decision related to environment

As it happened with safety, a management system approach had to be adopted. Ferrone [54] uses the term «industrial metabolism», the analysis of which leads to the following considerations:

- organizational policy takes into account the environmental aspects of processes and activities
- business strategies and objectives are set incorporating issues related to environmental performance of the organizational activities, for achieving cost-effectiveness and resource productivity
- the overall business mentality is influenced by the principles of eco-efficient systems that control material flow in product creation for the benefit of both the environment and the bottom line.

Fiskel [53], as well as Ferrone, [54] put emphasis on the importance of focusing environmental aspects at the design stages of products, services and projects, for achieving improvement of environmental performance and increased operational efficiency. The latter calls it «prevention at the source».

The first movement for establishing a framework to support the **management system approach** of environmental issues in a European Union-wide basis was the **Council Regulation (EEC) No 1836/93 of 29 June 1993 allowing voluntary participation by companies in the industrial sector in a Community eco-management and audit scheme (EMAS)**. This Regulation set a new legal standard for environmental credibility. Sustainable development is an underlying concept of this regulation, as it happens with all major legislation of the European Community, including the Fifth Environment Action Program (March 1992) and the Maastricht Treaty. Tanega [55] refers to that concept as the concept of choosing the most efficient way to make profits without harming the viability of common life support system for the next generation. The author proposes for this Regulation to be seen in light of the historical context of two decades of increasing environmental regulations throughout the industrialized world and underlines that the revolutionary dimension of this Regulation is that it proposes a systematic way for industrialists, regulators and consumers to attach the environmental challenge.

It is quite clear that EMAS was a fundamental for establishing the management system approach, an approach that was integrated by the establishment of the BS 7750:1994 «Specification for Environmental Management System» standard and of the ISO 14000 standards.

A presentation of an outline of the EMAS content as it is described by Tanega [55] is considered to be useful for highlighting the key points of it. Initially, it must be mentioned that when an organization operates more than one sites where industrial activities are performed, each site has to be prepared for a separate registration to EMAS.

The four (4) major elements of EMAS are the following:

1. **Creation of an Environmental Management System**, the requirements of which are listed below:
 - Environmental policy, objectives and programs
 - Organization and personnel, including arrangements related to:
 - ⇒ responsibility and authority
 - ⇒ management representative
 - ⇒ personnel communication and training
 - Environmental effects evaluation and registration, including
 - ⇒ initial environmental review
 - ⇒ register of legislative, regulatory and other policy requirements
 - Operational control, including
 - ⇒ establishment of operating procedures
 - ⇒ monitoring
 - ⇒ non-compliance and corrective action

- Environmental management documentation records
- Environmental audits.

2. Environmental Statement

This statement is designed for the public and it summarizes the environmental management system, describing the organization's activities, assessing the significant environmental issues and providing summary figures on:

- pollution emissions
- waste generation
- consumption of raw material
- consumption of energy and water
- generation of noise
- other significant environmental aspects as appropriate.

3. Auditing and Validation by the Environmental Verifier

The environmental verifier will scrutinize the statement against the actual activities found at the site, by doing a physical inspection of the site. The environmental verifier will approve the statement or will give it a conditional approval, which means that the company has the opportunity to correct deficiencies and resubmit the statement for approval.

4. Public Recognition of the Organization's Efforts in Continuous Environmental Improvement

Once the organization's name (including the relevant site) has been submitted by the competent body for registration with the European Commission, then the organization has the continuous duty of finding a way to manage continuous environmental improvement. The preparation of the environmental statement has to take place at least once every three (3) years and a simplified statement needs to be filed on an annual basis, which shows any significant difference from previous statements.

The key point of EMAS is the requirement for the environmental statement that is designed for the public and this point is the most outstanding difference between EMAS and the ISO 14001:1996 standard, or the «principle» difference between them, according to Holmes [56].

Powley [57] identifies a number of issues related to EMAS environmental statement, the most important of which are the following:

- the balance between the requirement for comprehensibility and the technical information that should be included in the statement
- the objectives set in relation to the significant environmental issues and effects on the site
- the accuracy of figures of pollutant emissions, waste generation etc., in relation to the way progress can be monitored throughout the three-year period.

Referring to the last of the above bullets, difficulty can be seen in cases of organizations that make their first steps to systematically approach the environmental impacts of their activities and also in cases of organizations with limited resources, like

SMEs. The EC Regulation recognizes the difficulties SMEs may face when getting involved in EMAS, by its special reference to the establishment or promotion of technical assistance measures and structures by the Member States for encouraging participation of SMEs (Article 13).

Reviewing the activities that took place in the area of environmental management systems standardization, in 1993 ISO set up a technical committee, ISO/TC 207 «Environmental Management», to develop relevant standards, as the Strategic Advisory Group of Environment (SAGE) had proposed. The need for standardization of environmental management systems met the establishment of EMAS.

In 1994, the British Standards Institute publishes the BS 7750 «Specification for Environmental Management System», a standard setting requirements for building up and operating an environmental management system and also serving certification purposes. This document was one of the key documents used during the development of the **ISO 14001:1996 standard**, as Barthel [58] notes. Their relationship is profound, in terms of their structure, content, and implementation; Sayre [59] reports that the Ciba-Geigy plant in Newport, Delaware, has used the BS 7750:1994 standard as a guide to be prepared for certification against the ISO 14001:1996 standard.

The ISO 14001:1996 standard provides those requirements for developing and implementing an appropriate environmental management system and also for serving certification purposes. This standard can be used by organizations of all kinds and sizes. In paragraph A.1:General requirements, of Annex A of the standard, the environmental management system is considered to be a tool which enables the organization to achieve and systematically control the level of environmental performance that it sets itself and its establishment will not, in itself, necessarily result in an immediate reduction of adverse environmental impact.

This clarification is very important because organizations and especially SMEs, very often consider environmental management system implementation to require immediate changes in technology and materials used, meaning that significant investments should take place in a short period of time, which usually cannot be afforded. An additional clarification is included in the same paragraph of Annex A of the standard, about the fact that the level of detail and complexity of the environmental management system, the extent of documentation and the resources devoted to it, depend on the size of an organization and the nature of its activities. The importance of this clarification for SMEs is also underlined.

The ISO 14001:1996 standard is based on the **Environmental Management System Model of Continuous Improvement**, presented on figure 4/2. This model indicates the dynamic continual improvement looping relationship between the required elements of the system. An outline of these elements follows:

1. **Definition of Environmental Policy** by top management.
2. **Planning**, including requirements for:
 - identification of environmental aspects

- identification and access to legal and other requirements
- establishment of environmental objectives and targets
- establishment of environmental management program(s)

3. Implementation and Operation, including requirements for:

- structure and responsibility
- training, awareness and competence
- communication
- environmental management system documentation
- document control
- operational control (for operations and activities associated with the identified significant environmental aspects)
- emergency preparedness and response

4. Checking and Corrective Action, including requirements for:

- monitoring and measurement of the key characteristics of operations and activities associated with the identified significant environmental aspects
- nonconformance and corrective and preventive action
- environmental records
- environmental management system audit

5. Management Review of the environmental management system to ensure its continuing suitability, adequacy and effectiveness.

Organizations that fully and adequately implement the required elements of the standard can apply to Certification Bodies for a third party audit to acquire the relevant certificate.

Similarities between the required elements of the ISO 14001:1996 standard and the first major element of EMAS for the creation of an environmental management system are quite clear, in terms of their structure and content. Exactly this observation is their common principle: they both require an environmental management system to be in place and to operate effectively. Consequently, they both require **top management commitment**.

Nevertheless, apart from:

- the basic difference between these two (2) frameworks, which relies on the EMAS requirement for the environmental statement (and has been analyzed above),
- the difference between the scope of their application (EMAS refers only to organizations of the industrial sector) and
- the fact that EMAS is site-based whereas the ISO 14001:1996 standard can be cross-site,

there are additional differences between them, regarding their philosophy and implementation practices. This point has been indicated also by the results of the relevant literature review.

Harmer [60] views that a significant difference between the ISO 14001:1996 standard and EMAS is related to their focus; the international standard can be seen as a management system focusing on the needs of organizations for internal improvement and environmental improvements emerge from the system. On the other hand, EMAS focuses on environmental improvement and the provision of information to the public, so its focus is much wider than internal.

This viewpoint is considered to be rather sound and it is a reason that the ISO 14001:1996 standard should be selected by SMEs, at least as the fundamental step for their involvement with environmental management and absolutely for management system integration purposes.

Scott [61], describing how ISO 14000 approach EMAS in terms of stating their legal interrelation, refers to the fact that the ISO 14001:1996 standard is based on a range of prescriptive procedures, while EMAS is centered on setting specific environmental performance goals.

Holmes [56] characterizes the requirements of EMAS more onerous than those of the ISO 14001:1996 standard. The author also attempts to identify the EMAS registration trends in European countries but sound results cannot be taken since every country and industrial sector appear different statistical data in relation to organizations' preference to EMAS.

In terms of using ISO 14000 certification or EMAS registration for issues of competition, Powley [57] underlines that the willingness of an organization to publish details on its environmental performance (through the environmental statement required by EMAS) may raise the stakes on the competition within environmentally sensitive industrial sectors. According to the thesis author's opinion, ISO 14000 certification can enhance the profile of organizations in a wider basis.

Based on the above, it can be said that the special characteristics of SMEs and also their needs for survival and development (see paragraph 2.1) lead to the choice of implementing the ISO 14001:1996 standard for introducing to these organizations a management system approach to environmental issues and, moreover, for achieving a systems integration with quality and safety management, due to its structure, focus and applicability.

Referring to each of the required elements of the ISO 14001:1996 standard, it is possible to come to conclusions about the way they can be implemented to SMEs and

used for a systems integration of quality, safety and environmental management. At this point, it is useful to underline the relevant results of the data collection procedure:

- a. SMEs do not ask for consultancy in the area of environmental management and sometimes they do not even know their legal obligations in relation to their environmental performance

- b. The environmental performance of SMEs may be better, if the legislation of the relevant sector is strict
- c. SMEs do not adopt a management systems approach in the area of environmental management.

Consequently, the requirements of the ISO 14001:1996 standard can constitute a tangible framework for SMEs to be introduced to the concept and practices of environmental management system.

The principle role of **top management's commitment and involvement** is made obvious through the first element of the ISO 14001:1996 standard that refers to **Environmental Policy** (clause 4.2). The ISO 14004:1996 standard also emphasizes the fact that the ongoing commitment and leadership of the top management are crucial.

As it happens with the implementation of any other management system, top management commitment and active involvement is a prerequisite for the successful implementation of an environmental management system. Considering the special role of top management in SMEs (see 2.1.3), this fact is enhanced.

Hemenway *et al* [62], in an analysis of the relationship between Total Quality Environmental Management (an approach which takes the concepts embodied in Total Quality Management and translates them into environmental management) and the ISO 14001:1996 standard, underline the importance of top management commitment. In relation to that, the authors stress on the significance of the alignment of business strategies, philosophy, tools and language (which are set by top management) and those of environmental management for the success of an integration effort. Obviously, if top management is not committed to the environmental management implementation, such alignment cannot be achieved.

Kiel [63], outlining the differences between the way large and small organizations deal with the implementation of an environmental management system, comes to the following conclusions:

1. There is a different motivation for environment; large organizations are more focused to environmental mission statements, whereas SMEs are driven by their needs for survival: cost reduction, quality, competitiveness.
2. Leadership commitment is expressed differently; in large organizations is shown through systems, whereas in smaller ones the owner himself shows his commitment and is tremendously involved.
3. The success of the implementation of an environmental management system is not so much a function of organizational size but of organizational commitment and leadership competence.

The above conclusions are in full agreement with the SMEs special characteristics and needs (see 2.1) and highlight the importance of top management commitment for the successful implementation of an environmental management system.

The ISO 14004:1996 standard proposes an initial environmental review to take place to facilitate the development of the environmental policy. The level of analysis of such a review should be tailored to the organizational characteristics, but, surely, a detailed identification of legislative and other obligatory requirements should be a primary concern, as the environmental policy should include a commitment to comply with all these requirements.

The environmental policy should reflect the commitment of top management to continual improvement and prevention of pollution, should be communicated to all employees and should be available to the public. Continual improvement is a fundamental principle of the quality, safety and environmental management system standards and of the Business Excellence Model - moreover, it is an imperative for the survival and development of SMEs.

Planning (clause 4.3) is the second element of the ISO 14001:1996 standard.

Hadlet [...], in an attempt to outline the relationship between the requirements of the ISO 9001:1994 and the ISO 14001:1996 standards, refers to the fact that the requirement of quality planning stated in the former standard (subclause 4.2.3) and the requirement of planning stated in the latter one (clause 4.3) do not match up; in the ISO 9001:1994 standard, planning is largely implied and the emphasis, in term of requirements, is primarily on the output which is the quality plan, whereas the ISO 14001:1996 standard puts the planning process itself at the central core of its requirements. According to the thesis author's opinion, a difference actually relies on the fact that the ISO 14001:1996 standard includes the requirement for establishment and documentation of environmental objectives and targets in its element of planning, giving to it a more, say, universal significance. The ISO 9001:1994 standard stresses more on the technical quality planning. Nevertheless, this difference is rather structural and has been overleaped, since the ISO 9001:2000 standard incorporates the requirements of quality objectives and planning in the same clause (5.4) of the element of Management Responsibility (see 2.2.2).

The identification of the controllable **environmental aspects** (subclause 4.3.1) of an organization's activities, products or services for determining those which have or can have significant impacts on the environment is a basic requirement of the ISO 14001:1996 standard. It should be mentioned here that, as the data collection procedure showed, SMEs do not identify the environmental aspects of their activities; they deal only with those whose impact to the environment is very obvious and serious and also with those that they have identified that are legally obliged to deal with. This situation is an obstacle for SMEs to realize the total worth of an environmental management system implementation and to track all the financial and other benefits that can be resulted from that. An indicative example has to do with materials supply chain management, which is directly related to cost; an organization, by identifying the environmental aspects of the stocks and consumption of raw materials and packaging materials, it approaches the need of better managing the whole materials supply chain, which can lead to cost reduction and efficiency improvement (a more analytical reference to the relationship between supply chain management / logistics management and environmental management systems is presented further down).

Horsfall [64] describes a real situation of developing an environmental management system according to the ISO 14001:1996 standard in a steel production facility and, in relation to the requirement of identification of environmental aspects of activities, products or services for determining the relevant significant impacts on environment, he refers to the creation of a register of significant environmental effects including, for each effect, all its technical characteristics, the responsible person, emergency or notification process and specific regulatory or permit requirements. The preparation of such register is considered to be useful for further planning activities.

Camarota *et al* [65] approaches the situation from the aspect of controlling **environmental risks**, considering it as the most cost-effective and proactive method of managing the risk of environmental exposures. The author refers to three (3) steps of the risk assessment process:

- the activities of environmental hazard identification
- the exposure assessment and
- the risk characterization.

This process can facilitate the identification of environmental aspects of activities, products or services and the determination of the relevant significant impacts on the environment. The relationship between these steps and the occupational health and safety risk assessment as it is presented in the BS 8800:1996 standard is close.

The identification of the **legal and other requirements** (subclause 4.3.2 of the ISO 14001:1996 standard) is an important process, complementary to that of environmental aspects identification, and its implementation should be ensure in SMEs.

Referring to the ISO 14001:1996 standard requirement for the **establishment of environmental objectives and targets** (subclause 4.3.3), it must be said that a critical factor is to make all personnel realize the importance of achieving them for the overall organizational performance. Jackson [66] focuses on that issue, underlining the importance of correlating environmental improvement with financial or business results, by translating the physical and technical results of the environmental management system into cost information, to enhance the worth of the system among personnel of all organizational levels. To achieve this, Marcus [67] proposes a financial management approach of planning investments and activities related to environmental, health and safety performance excellence to be adopted and not just to stick around the organizational obligation of complying to legislation. This can be accomplished by integrating environmental, health and safety objectives to strategic management processes.

The ISO 14001:1996 standard requirement for **establishing environmental management programs** (subclause 4.3.4) for achieving objectives and targets should be carried in the framework of preparing the overall business program and, especially in SMEs, should be based on properly set priorities.

The ISO 14001:1996 standard element of **implementation and operation** (clause 4.4) focuses on **clarification of roles, responsibilities and authorities** (subclause

4.4.1) and **personnel awareness and training** (subclause 4.4.2), as it happens with the relevant quality and safety management system standards.

The clarification of roles, responsibilities and authorities is another weak point of SMEs (see 2.1.4) and the implementation of the quality, safety and environmental management system standards can contribute positively to this field in a fully integrated way.

Training activities, based on identified environmental training needs, are a prerequisite for assuring awareness and competencies of employees of all organizational levels. Referring to the three (3) categories of employee training set by the thesis author (see 2.2.2), the category of focused training is related to the requirements of the ISO 14001:1996 standard. The category of training on a job-specific basis may also be necessary in cases where the job activities of employees are linked with new arrangements or changes caused by the implementation of the environmental management system.

The ISO 14004:1996 standard links employee environmental awareness with **motivation** and underlines the key role of top management in building awareness and motivating employees by its commitment, since the commitment of individuals transforms the environmental management system from paperwork to effective processes. Surely, this fact is directly related to quality and safety management systems as well.

The role of highly motivating staff in achieving integration of environmental management to the overall organizational business activities is highlighted also by Hemenway *et al* [62].

Communication is a distinct requirement of the ISO 14001:1996 standard (subclause 4.4.3) and aims at establishing a systems approach of internal communication activities and communication activities with external interested parties, in relation to organizational environmental aspects and the environmental management system. A reference should be made to the fact that the data collection procedure, and, more specifically, the interviews with Certification Bodies, showed that SMEs have not developed mechanisms of regular communication with them and their communication takes place only for typical reasons.

Beechner *et al* [68], referring to **communication with external interested parties**, use the term «environmental customers» and address to local citizens and government representatives. The authors believe that it might be worthwhile to include the external communication process in the quality framework, because quality imperatives also affect the environmental customers. This viewpoint enhances integration.

External communication activities, as they are required by the ISO 14001:1996 standard, meet the areas of concern of Criterion 8: Impact on Society, of the Business Excellence Model.

It is important to see the ISO 14001:1996 standard requirement for **internal communication** as an opportunity for an organization to improve, or even establish

effective and efficient internal communication paths in an integrated way. Considering the special characteristics of SMEs (see paragraph 2.1), such arrangements would be of vital importance.

Environmental management system documentation (subclause 4.4.4) is a requirement of the ISO 14001:1996 standard as it happens also with the relevant standards for quality and safety management systems. It should be noted that in some cases, attempts of integrating the quality and environmental management systems are made through merging documentation. Culley [69] focuses the integration of documentation required by the ISO 9001:1994 and the ISO 14001:1996 standards as a means of minimizing the time needed for writing documents, control certification and external auditing cost and also for achieving the creation of a comprehensive management system.

Referring to the issues of integration, Lawrence [70] describes how a cement production organization decided to implement an environmental management system according to the ISO 14001:1996 standard as a standalone system and not to integrate it in its current quality management system, to assure that the importance of environmental control was not lost. This issue is related to the fact that the cement industry usually has serious consequences for the environment, so the environmental control becomes extremely important. According to the thesis author's opinion, management systems integration based on process analysis does not mean that particular issues are losing their importance, getting lost in an overall management framework. The significance of each parameter of integrated management system to a process determined the way this process should be managed and controlled.

The issue of management systems integration has been more extensively analyzed in 2.2.2, where additional literature references in the area of integrated management systems are presented.

Operational control activities (subclause 4.4.5), according to the ISO 14004:1996 standard, can be divided into three (3) categories:

1. activities to prevent pollution and conserve resources in new capital projects, process changes and resource management, property (acquisition, divestitures and property management) and the new products and packing
2. daily management activities to assure conformance to internal and external organizational requirements and to ensure their efficiency and effectiveness
3. strategic management activities to anticipate and respond to changing environmental requirements.

These categories of activities should be tailored to the special characteristics and the possibilities of every organization and also to the priorities of the organization over time. The second category reflects those activities that are absolutely required in a continuous basis.

The requirement of operational control includes those arrangements that are directly linked with logistics management.

Lambert *et al* [71] refer to the term of **logistics management** by using the definition of the Council of Logistics Management (CLM): «Logistics management is defined as the process of planning, implementing and controlling the efficient, effective flow and storage of goods, services and related information, from point of origin to point of consumption for the purpose of conforming to customer requirements».

The relationship between environmental management systems and traditional integrated logistics systems elements is obvious, according to Pratt [72], as the steps necessary to establish the former are integral to the latter. The author refers specifically to the following elements: data management, change management, field support, training, maintainability, inventory management, transportation and distribution, electronics data and systems integration. The most obvious field where environmental management meets logistics management is that of material inventory control.

Handfield *et al* [73] view that the supply chain management is central to environmentally friendly practices. They also remark that supply chain partners should not fail to comply with environmental regulation. This remark is very important for SMEs that may be suppliers of bigger organizations to which environmental performance and compliance to the relevant regulation could be of prime importance. As SMEs may rely on one or two big customers (see 2.1.2), to be excluded due to their poor environmental performance would put them in a quite difficult position.

It is clear that all activities related to the entire flow of materials, including transportation and storage, play a significant role to the environmental performance of an organization. Reversely, the implementation of an effective environmental management system results to better management of the materials supply chain, including: inventory issues, cooperation with suppliers (mutually beneficial supplier relationships is a quality management principle according to the ISO 9004:2000 standard), transportation activities etc., which consequently results to cost reduction.

Activities related to **emergency preparedness and response** (subclause 4.4.7) can lead to loss avoidance. These activities can be combined with the relevant ones included in the BS 8800:1996 standard and integrated environmental and safety emergency plans can be designed and developed.

The element of **checking and preventing action** (clause 4.5) is a key for achieving the operation of the continual improvement looping mechanism. Jackson [66] outlines how **monitoring and measurement** (subclause 4.5.1 of the ISO 14001:1996 standard) systems can be approached in environmental management. She focuses on the issue of how the measurements are carried out since, very often, measuring performance is not a necessary element of daily business and can be easily overlooked. This issue is even more important in cases of SMEs where employees are usually overloaded by numerous different tasks, as human resources are almost always limited. Environmental monitoring and measurement should be integrated to the day-to-day activities for assuring that it is regularly carried out and for minimizing the possibility of being overlooked.

The framework of requirements for monitoring and measurement activities include the documentation and implementation of procedure for periodically evaluating compliance with relevant environmental legislation and regulations. Such procedure can be addresses to occupational health and safety legislation and regulations as well.

Since **prevention** is critical to all environmental issues, environmental incidents should be taken under serious consideration. Horsfall [64] proposes the implementation of environmental event reporting, which is a reporting system to ensure that the regulatory authorities, customers, insurers, senior management and the responsible managers are advised in the event of any incident that could adversely affect the environment.

Environmental management system audits (subclause 4.5.4 of the ISO 14001:1996 standard) should be carried out in the same way as it happens with audits required by the relevant quality and safety management system standards. The results of such audits are reported to top management for carrying out the management review.

Management review (clause 4.6 of the ISO 14001:1996 standard) is the element that ensures the sustained top management commitment to the environmental management system principles and its contribution to the continual performance improvement process, as this element actually closes the continual performance improvement loop indicated in the environmental management system model (see figure 5/2).

Outlining the benefits of implementing an environmental management system according to the ISO 14001:1996 standard, Barthel [58] refers to a number of potential trade-related and financial benefits, the most important of which are the following:

1. reducing raw material and energy usage
2. identifying waste minimization opportunities
3. meeting certification criteria imposed by vendor organizations in contractual specifications
4. improving internal communication with staff members and contractors and external relations with the local community, the general and government at every level
5. enhancing their corporate environmental image, meeting consumer expectations and thus improving market share
6. acting in a proactive manner to minimize exposure to environmental liabilities, thereby reducing insurance premiums and incidences of non-compliance with legislation.

In relation to the reduction of insurance premiums, Winans [74] refers to the fact that no proven statistical relationship exists between ISO 14000 and ISO 9000 certifications and the cost of insuring, but there is a possibility for the certifications to act as qualitative comfort level boosters.

Environmental management system integrated to the quality and safety management systems in all business processes fulfills their scope, providing a proper framework for

organizations to continuously improve their overall performance. In cases of SMEs such framework can contribute efficiently to their efforts for survival and development.

2.2.5 Integrated Basis of Quality, Safety and Environmental Management Standards

The aim of this paragraph is to describe a structural basis that integrates the quality, safety and environmental management standards (ISO 9001:2000, BS 8800:1996, ISO 14001:1996) requirements that should be fulfilled by the implementation of the IMS route-map. It must be mentioned that the BS 8800:1996 provides guidance instead of a set of requirements, as this standard has not been produced for certification purposes, but this point does not influence the situation.

Another point that should be clarified is that this integrated basis is **structural** and does not have the meaning of corresponding clauses between the standards. It will indicate generic directions that should be addressed by the IMS route-map.

The integrated basis is structured upon the platform of the ISO 9001:2000 standard and consists of the following major elements:

- **Initial Status Review Activities**
- **Management Responsibility**
- **Planning**
- **Resource Management**
- **Process Management**
- **Measurement, Analysis and Improvement**

Each of these major elements includes specific requirements that integrate those of the three (3) standards. The focal requirements of these major elements are outlined below.

Initial Status Review Activities

- Determination of the organization's current management arrangements in relation to quality, safety and environmental issues
- Review of these activities against specified requirements (product / service standards, legal and other obligatory requirements, regulations etc.)
- Documentation of the initial status review activities results

Management Responsibility

- Establishment of an integrated policy statement addressing quality, safety and environmental aspects
- Definition of customer requirements and of safety and environmental performance acceptable levels (including legal and other requirements)

- Establishment of an integrated management system for quality, safety and environmental issues as a means to ensure that the product / service conforms to specified requirements, while the organization achieves to keep its safety and environmental performance above the acceptable levels
- Assignment of quality, safety and environmental management representative(s)
- Definition of roles, responsibilities and authorities and of their structural relationship against quality, safety and environmental issues
- Preparation of the system documentation depending on the special characteristics of the organization and the nature of its activities
- Control of the system documents
- Control of the system records, as a means to demonstrate conformance to the relevant requirements and effectiveness of the system's operation
- Top management review of :
 - the overall performance of the system from the aspects of its suitability, adequacy and effectiveness
 - possible changes of the external circumstances,
 based on input from measurement, analysis and improvement activities for determining the necessary action plans.

Planning

- Establishment of documented quality, safety and environmental objectives and targets in consistency with the integrated policy statement
- Identification of quality, safety and environmental aspects of processes (risk assessment in generic terms)
- Allocation of resources, responsibilities and authorities needed
- Preparation of a program to achieve quality, safety and environmental objectives

Resource Management

- Personnel assignment
- Human resources awareness, training and competence
- Access, maintenance and protection of necessary information (including legal and other requirements)
- Determination and availability of necessary infrastructure
- Work environment arrangements

Process Management

- Process for internal and external communication
- Processes related to customers and other interested parties
- Processes related to design and development
- Processes related to purchasing activities (including quality, safety and environmental aspects and impacts of purchased products and / or services)
- Production and service operation processes (including all parameters influencing the quality of output, the suitability and adequacy of equipment, the safety conditions of the working environment and the control of their environmental impact)

- ❑ Processes related to control of non-conformity and to emergency preparedness and response

Measurement, Analysis and Improvement

- ❑ Proactive measurement and monitoring of system performance towards internal quality, safety and environmental arrangements through internal audits
- ❑ Measurement of customer satisfaction and reactive measurement of safety and environmental performance based on relevant evidence
- ❑ Measurement of process output
- ❑ Measurement of product and / or service
- ❑ Control of measuring, inspection and test equipment
- ❑ Analysis of data related to the system performance collected from relevant sources
- ❑ Improvement mechanisms (based on corrective action, preventive action and continuous improvement looping)

A model of the way that the major elements of the integrated basis are linked is presented in figure 5/2.

2.3 The Business Excellence Model Approach

2.3.1 Brief Review of the Business Excellence Model

As a management approach, Business Excellence over the past two (2) decades has been recognized increasingly as the primary route to the achievement of competitive advantage. The Business Excellence Model was developed by the European Foundation of Quality Management (EFQM) in 1988 as a reference model against which an organization could implement the Self Assessment technique (this concept was first fully formulated in the process used for the American Malcolm Baldrige National Quality Award which was established in 1987). Actually, it can be said that it is an integrated approach for an organization's overall management system to achieve business excellence, based on a number of linked performance criteria and providing the possibility of implementing a continuous improvement process through the technique of Self Assessment.

The basic concepts of Business Excellence are the following:

- **Leadership and consistency of purpose**
- **People development, involvement and satisfaction**
- **Customer focus**
- **Supplier partnership**
- **Processes and measurement**
- **Continuous improvement and innovation**
- **Public responsibility**
- **Results orientation**

Comparing these concepts to the eight (8) quality management principles included in the ISO 9004:2000 standard (see paragraph 0.2), it is obvious that the orientation is common. The concepts of business excellence reflect the principles of quality management and vice versa. Referring to the basic requirements of the ISO 9001:2000 standard, a standard against which organizations will be assessed by internal and external parties for their capability to meet customer requirements, a close orientation can also be seen. Nevertheless, the aims of this standard differ from those of Business Excellence Model (see 2.2.2).

The Business Excellence Model recognizes as stakeholders of an organization all those who have an interest, whether financial or not, in the continuing success of the organization, which can be:

- ⇒ internal leaders (senior managers and the board)
- ⇒ the people of the organization (employees and non-paid volunteers)
- ⇒ the customer (the purchaser of the product or service)
- ⇒ the external influencers (the government, the community, the potential customer, etc.)
- ⇒ the suppliers

The crucial importance of leadership is indicated also in the Business Excellence Model, in which it is considered to have the greatest influence on an organization's activities, policies etc.

The Business Excellence Model provides a framework of nine (9) criteria that can be applied to any organization or part of an organization. These criteria are grouped in two (2) categories:

- **Enablers**, which are concerned with how the organization runs the following:
 - leadership
 - policy and strategy
 - people management
 - resources
 - processes

- **Results**, which are concerned with what it achieves, regarding the following fields:
 - customer satisfaction
 - people satisfaction
 - impact on society
 - business results

In figure 6/2, the Business Excellence Model is presented. In this figure, the way that the criteria are grouped and linked and their relevant significance for achieving business excellence are presented.

Each criterion is broken down to a number of criterion parts, areas within which most excellent organizations have management approaches. Each criterion part provides a list of areas to address.

It is quite clear that the inclination of the Business Excellence Model is generic and it is to be adjusted to the characteristics of the organization (size, culture, activities, background, external environment etc.). If a self assessment process takes place, the only requirement for the organization is to address to all criteria.

As a management approach, business excellence can be cultivated to all organizations, also to SMEs. The way and the duration of this cultivation strongly depends on the special characteristics of the organization. Rooney [8] refers to the fact that for SMEs that struggle daily to survive, a proper implementation of the ISO 9001:1994 standard assures the basic principles of a management systems. The data collection procedure of the research project definitely proved that only in SMEs where a quality management system according to ISO 9000 standards exists (certified or not), a systems approach to management could be traced in the organizational culture. So, according to the thesis author's opinion, the culture and principles of business excellence can be successfully introduced and developed in SMEs that properly implement a quality management system, based on the ISO 9001:2000 and ISO 9004:2000 standards. A management system integrating quality, safety and environmental issues would be an even better background.

The Business Excellence Model Guidance for Small Businesses, which was first included in the British Quality Foundation edition of 1996, is very useful for these organizations to primarily focus their concern on the proper areas, rather than running through the overall criteria trying to find an edge to start.

Some important points related to the Business Excellence Model criteria and the relevant guidance for small businesses are discussed below.

Criterion 1: Leadership is defined as «how the behaviour and actions of the executive team and all other leaders inspire, support and promote a culture of business excellence as the best way to achieve the organization's objectives».

This criterion's relevant significance for achieving business excellence is 10 %, but in cases of SMEs its relevant significance could be considered as much higher, because leadership is the most critical parameter influencing these organizations' activities. The word «inspire» in the criterion's definition is of key importance for SMEs because actually the culture, mentality and behaviour of the leader determine the whole organizational culture and the only chance for a new idea or approach to be adopted is if this idea or approach is inspired and communicated by the leader (see 2.1.3).

A point that should be underlined, while reviewing the special guidance for small businesses given for this criterion, has to do with the critical look that a leader should take at his leadership style for identifying how it could be improved. If SMEs leaders learn to look critically at themselves, automatically they will look critically at their business and, again automatically, the improvement process will start.

Criterion 2: Policy and Strategy is defined as «how the organization formulates, deploys, reviews and turns policy and strategy into plans and actions».

This criterion's relevant significance for achieving business excellence is 8 % and the key point is the development of the organization's policy and strategy through mission, values and vision that the organization has established and also through the business excellence principles.

The establishment of mission, values and vision for an SME can be considered as a significant step for its survival and development. These words could often be heard as a «luxury» for the every-day difficulties that these organization face but in fact they constitute their perspective and the proper background for sustaining business planning.

As top management commitment to quality, safety and environmental management systems principles should be expressed clearly in the relevant policy statements, an integrated policy statement of an SME can be developed in consistency with organizational mission, values and vision oriented to quality, safety and environmental management concepts. The implementation of the IMS route-map to SMEs should provide them an opportunity to establish their mission statement, the

values upon which they carry out their business activities and a vision for the continuous improvement of their performance and their development.

In the special guidance for small businesses [5], a reference is made to the balance that must be kept between the necessity of small businesses to undertake a longer term planning, as it provides a proactive management approach and allows a strategy to be implemented, and the flexibility that they have to retain. The judgment of the level of a longer term planning that should be made by the top management of small businesses, should be facilitated by a continuous performance assessment monitoring mechanism provided by the IMS route-map.

Criterion 3: People Management is defined as «how the organization releases the full potential of its people».

This criterion's relevant significance for achieving business excellence is 9 % and it addresses to issues of full exploitation of human resources through investing on them and providing them a framework to be and to feel cared for.

Human resources are a key parameter for the success of all types and sizes of organizations. As SMEs quite often employ less people than needed and, additionally, less competent people, issues like sustaining capabilities, development of competencies and continuous training become crucial for their development and continuous improvement. Management system activities relating to human resources exploitation, like clear delegation of responsibilities and setting of priorities are absolutely necessary to organizations and especially to SMEs, where the organizational structure weaknesses (see 2.1.4), the communication informality and the fact that employees may have a number of different roles to play, allow misunderstandings and «gray areas» between employees responsibilities to appear, when at the same time employees' roles and responsibilities may overlap, leading to performance inefficiency.

Issues like development of improved and more formal communication paths between employees of all levels according to the organizational needs and also employee involvement enhancement are outlined in the special guidance for small businesses. The introduction of an IMS assures a level of formality in communication paths. In some cases of SMEs, this level should be a little higher, for start improving situations of organizational absence.

Based on the issues mentioned for people's care, the integration of safety and environmental management systems to an overall management system could be a purposeful decision for SMEs and it can be accomplished through the IMS route-map implementation.

Criterion 4: Resources is defined as «how the organization manages resources effectively and efficiently».

This criterion's relevant significance for achieving business excellence is 9 %, as it happens also with the previous criterion that had to do only with the human resources.

Financial resources, information resources, supplier relationships and materials, machinery, assets and technology resources have to be managed in the most effective and efficient way, especially in cases of SMEs, where resources of all categories are often limited.

Optimizing materials inventories, improving the supply chain and waste management are related to the cost-effectiveness of an SME and also its quality and environmental performance. These issues are included in logistics activities which should be addressed by the IMS route-map.

Properly designed maintenance activities of machinery and assets are related to all parameters of the IMS (quality, safety, environmental management) and result to reduction of operational cost.

Criterion 5: Processes is defined as «how the organization identifies, manages, reviews and improves its processes».

This criterion's relevant significance for achieving business excellence is 14 %, so it is the most critical of the enablers. The most important issues of this criterion, especially for SMEs are the definition of key processes of the organization and the establishment of processes ownership.

In the special guidance for small businesses [5], reference is made to the fact that the quality management systems according to the ISO 9000 standards that are implemented in these organizations should be purposeful, should address to the actual situations of the organizations and should result to clear business benefits. The IMS route-map has to be similarly oriented and the process analysis is of significant importance for developing a management system tailored to serve and not to burden an SME.

The establishment of processes ownership is a fundamental issue for SMEs, as:

- it facilitates responsibilities and authorities delegation
- it enhances employee involvement
- it provides a framework for setting employee objectives

Criterion 6: Customer Satisfaction is defined as «what the organization is achieving in relation to the satisfaction of each external customers».

This criterion's relevant significance for achieving business excellence is 20 %, a percentage that indicates that this is the most significant criterion. What is important is to establish mechanisms for systematically evaluating the level of customer satisfaction that is achieved by the organization. All aspects in relation to customer satisfaction should be considered, including price.

As competitiveness is achieved when an organization can satisfy or even exceed customer requirements, providing products in prices that customers are willing to pay, the evaluation of customer satisfaction should actually include the parameter of price,

which leads to the necessity of organizational cost-effectiveness and low operational cost, issues that have to be addressed by the IMS route-map for SMEs.

The special guidance for small businesses [5] points out the importance of learning from the customer his real requirements instead of assuming them, and the importance of taking feedback from the customers through formal and systematic activities (e.g. designed surveys). These issues have to be conducted by people from a marketing function and the IMS route-map has to provide system tools to facilitate the relevant activities.

Criterion 7: People Satisfaction is defined as «what the organization is achieving in relation to the satisfaction of each people».

This criterion's relevant significance for achieving business excellence is 9 %, equal to the criteria of people management and resources. The importance of how people feel for their working environment has been underlined by Total Quality Management principles and practices. Formally evaluating the level of people satisfaction is necessary for designing a successful human resources management system. The IMS route-map should be focused on the fact that people motivation and involvement are critical points for implementing policies and achieving objectives.

The special guidance for small businesses [5] refers to the necessity of evaluating people satisfaction based on proven data. System arrangement should provide the collection and processing of such data, in a way suitable for these organizations.

Criterion 8: Impact on Society is defined as «what the organization is achieving in satisfying the needs and expectations of the community at large».

This criterion's relevant significance for achieving business excellence is 6 % and the key issue is the evaluation of society's perception of the organization. The core concept of this criterion relies on the fact that the organization's interaction with the external environment (from a social and not a business point of view) should provide benefits for both sides.

The way that the organization manages the environmental impacts of its activities, in an effort of continuously reducing them and also the means by which this is demonstrated, are issues to be addressed. The IMS route-map should contribute to that point.

The special guidance for small businesses [5] focuses on the significance of local issues, as many of these organizations are located in small communities and influence the overall social life (e.g. by offering employment). The development of good relationships with the local authorities that can affect and regulate business is also an important issue. The organizations' top management should determine the relevant activities.

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Criterion 9: Business Results is defined as «what the organization is achieving in relation to its planned objectives and in satisfying the needs and expectations of everyone with an interest or stake in the organization».

This criterion's relevant significance for achieving business excellence is 15 %. Organization's performance should be monitored through financial measures and efficiency and effectiveness measures related to key processes. The IMS route-map should play a significant role in this monitoring, providing to SMEs a dynamically formulated information background for accurate and quick decision making and action taking for continuous improvement of organizational performance..

The special guidance for small businesses [5] refers to the fact that the organization should be aware of how the results achieved are linked with the management practices used. This is a very important point that should be taken under consideration especially by top management because, as small businesses managers are very much involved with day-to-day activities and the pressing business environment leads them to instant decisions and actions, they cannot be able to realize how their practices are ultimately linked with the results achieved and they do not have the opportunity to review and improve them. As mentioned above, this realistic issue can be resolved by the implementation of a tool for continuous performance assessment monitoring, provided by the IMS route-map.

Another point indicated by the special guidance for small businesses [5], which is related to business results is the targets setting in all key areas. The IMS route-map should lead to a convergence of quality, safety and management objectives and targets to those of the overall performance of the organization.

2.3.2 Brief Review of the Self Assessment Alternative Approaches

The process of Self Assessment towards the nine (9) criteria of the Business Excellence Model is a tool for achieving continuous performance improvement, if it is fully linked with an action plan that will exploit its results. It actually provides a “moment in time” picture of the status of the organization, upon which performance improvement activities should be designed and implemented.

Seven (7) different approaches are proposed to an organization to undertake Self Assessment:

- **the Award simulation approach**, which including the preparation of a full submission document along the lines described in the UK Quality Award for Business Excellence application brochure, and the establishment of an internal process similar to that employed in the Award, using a team of trained assessors.
- **the pro-forma approach**, based on the use of a set of suitable pro-formas, scored by trained assessors.
- **the questionnaire approach**, based on the use of simple “yes/no” questionnaires or more sophisticated ones with multiple choice answers

- **the software approach**, by using a software package called ASSESS which is a range of tools calibrated against the full UK Quality Award for Business Excellence, providing an incremental path to world class benchmarking, which enables organizations across all sectors to benchmark against the nine (9) criteria and the thirty-two (32) sub-criteria of the Business Excellence Model
- **the workshop approach**, based on training of the management team, data gathering, scoring workshop, agreeing improvement actions and reviewing progress against action plans
- **the matrix approach**, including the creation of a company specific achievement matrix within the framework of the Business Excellence Model, which typically consists of a series of statements of achievements against a number of points on a scale of 0-10 or similar and forms a part of a four-step workshop approach
- **the peer involvement approach**, that has many similarities to the Award simulation approach and combines extensive involvement of people from a business unit with a contribution from trained assessors drawn from managers external to the unit.

Each one of these approaches has specific advantages and disadvantages that are outlined in the “Guide to Self Assessment”. It is clear that all of these approaches require the involvement of trained individuals to carry out the scoring activities or to facilitate the overall assessment process.

Considering the case of SMEs, it can be assumed that it is quite difficult for them to initially get involved with the Self Assessment techniques, unless the principles of the Business Excellence Model have been cultivated within the organization and a mature management system is established and operates. Nevertheless, the approaches that according to the thesis author’s opinion seems to be more suitable for an SME to carry out the Self Assessment process is the pro-forma approach and the questionnaire approach, because:

- Pro-forma approach is easier and less time consuming than drafting a full Award style report and for these reasons more suitable for an SME
- Questionnaire approach is one of the least resource intensive and can be completed very quickly, provided an existing and proven questionnaire is used.

The software approach also could be suitable and useful for an SME, as the benchmarking process would benefit it, but the questions are quite specific and some of them probably could not be answered or addressed.

2.4 Business Process Analysis Principles and Techniques

The definition of the term process has been determined in point C of paragraph 0.3: “a process is a workflow that transfers inputs into outputs, appropriately coordinated for being effective and continuously improved”.

According to Johansson *et al* [3], by thinking about businesses as processes rather than as functions, managers can focus on streamlining processes in order to create more values for less effort rather than focusing on reducing the size of functions in order to simply to cut cost. The authors underline that cost cuts will naturally occur as not-value-adding activities are removed from the process and as the processes increase their level of effectiveness. Davenport *et al* [75] connect the development of **process thinking** with the quality movement.

The requirements and / or guidelines of the ISO 9001:2000, ISO 14001:1996 and BS 8800:1996 standards have a clear process-oriented approach. The Business Excellence Model also adopts this approach, putting the Criterion of Processes (defined as “how the organization identifies, manages, reviews and improves its processes”) in the core of its structure (see figure 6/2) and giving to it a relevant significance of 14 % for achieving excellence, which means that it is the most critical of the enablers (see 2.3.1).

Business process analysis indicates the sequence of activities within a business process and the way these activities are interrelated. By carrying out business process analysis, organizations make the first step to become process oriented and can examine how processes can be improved. For management systems integration, business process analysis and – up to an extent – redesign are a prerequisite because they lead to the identification of how the parameters of integration (in this case quality, safety and environmental management) influence the same process and to the determination of a way to manage influences through common arrangements.

Johansson *et al* [3] emphasize the importance of starting the analysis or redesign from the core business processes and they define a core process as a set of linked activities that both crosses functional boundaries and, when carried out in concert, addresses the needs and expectations of the marketplace and drives the organizational capabilities. Hammer and Champy [25] agree to that point.

Obviously in SMEs more than other organizations, core business processes determine their operational cost and their flexibility.

Johansson *et al* [3] propose the following process categorization:

- physical processes (e.g. processes related to material supply chain)

- logical processes (e.g. order entry, procurement)
- processes “on paper” (e.g. bid preparation)
- combination processes (e.g. product development).

This categorization is quite useful to understand processes throughout the overall organizational mechanism, since sometimes processes are meant to be just the physical ones. Quite often the improvement of processes of the other categories result to significant benefits for the organization.

Hammer and Champy [76] view that traditional process analysis takes the inputs and outputs as given and looks purely inside the process to measure and examine what goes on. They introduce the concept of **understanding processes** which means comprehending what the customer of the processes does with the output.

The term “**customer of the process**” meaning the recipients of the process outcome is used also by Davenport *et al* [75] who they divide them to internal and external to the organization.

Process owners actually have the responsibility to satisfy the customers of the processes. Hammer and Champy [76] underline the fact that traditional organizations lack process owners, as people do not tend to think in process terms and responsibility of processes is fragmented across organizational boundaries. It must be mentioned that, especially for SMEs where the clarification of responsibilities is usually poor (see 2.1.4), fragmented process responsibility puts in danger the efficiency and effectiveness of the process and its cost is high. On the other hand, the definition of process owners:

- contributes to the effort for adequate clarification of responsibilities
- directs to a process-oriented organizational mentality
- is cost effective
- facilitates integration.

Management systems integration activities, inevitably, extend the business process analysis to process rethinking and redesign. Gant [77] emphasizes that **process rethinking** should be carried out in all fronts: strategic, organizational and technological. This viewpoint is very critical and indicates that any effort for process improvement will have superficial results unless it is based on strategic decisions and it is implemented to the organizational framework. The technological front may not be feasible for SMEs to cope with in initial stages of the effort.

Hall *et al* [78] highlight six (6) crucial organizational elements that should be addressed when process redesign is implemented: roles and responsibilities; measurements and incentives; organizational structure; information technology; shared values; skills. Most of these elements reflect areas where changes should take place even when an organization implements a quality management system.

Booth [79] introduces an interesting approach of the area of business process analysis: **process modelling**. Process modelling is based on role activity diagrams which illustrate the roles that are taken in a process (which are indirectly related to people, positions or departments involved), the undertaken activities and the decisions that are made to control the process. It is not focused just on activities and information but also on how the process behaves. According to the author, the value of process modelling relies on allowing opportunities for improvement to become apparent and helping define a new set of future processes, either from a top-down design or from changing the current ones.

The adoption of the approach of process modelling has a potential of process evolution, related to what the author calls “process behaviour” as behaviour is a characteristic of live systems.

A practical way of examining and illustrating processes is proposed by Starr [80] and is that of **process charts**. Process charts are described by the author as maps of specific operations, transports, quality checks, storages and delays that are included in a process. Obviously process charts can incorporate the parameters of an integrated management system.

In this review of the literature related to business process analysis principles and techniques, a reference should be made to **Business Process Reengineering**.

Johansson *et al* [3] define business process reengineering as the means by which an organization can achieve radical change in performance as measured by cost, cycle time, service and quality, by the application of a variety of tools and techniques that focus on the business as a set of related customer-oriented core business processes, rather than a set of organizational functions.

The authors determine three (3) types of business process reengineering efforts that an organization can undertake:

Type 1: to achieve cost improvement

Type 2: to achieve competitive parity with those who have set the standards and made the rules in the past

Type 3: to effect a breakpoint, which means to change the rules and create the new definition of “best in class” for all others to try to attain.

For SMEs, a business process reengineering effort would be presumably of Type 1, as cost reduction is an imperative for these organizations and a prerequisite for them to continue their operation. From this point of view, the objective of such an effort is common to one of the objectives of management systems integration.

Hammer [32] underlines that business process reengineering triggers changes of many kinds and not just of the business process itself: changes in job designs, in organizational

structures and in management systems. He also emphasizes that a factor necessary for business process reengineering to succeed is the existence of executive leadership with real vision.

Davidson [81] goes further on and proposes **business transformation** as a broader and more powerful methodology than business process reengineering. According to the author, business transformation occurs in three (3) independent phases:

Phase 1: Pursuit of operating excellence, starting with automation and reengineering
Activities

Phase 2: Building on capabilities and infrastructure developed in Phase 1 to expand, enrich and focus the range of products and services offered to customers

Phase 3: New business units can appear, a new product and service offerings become Independent ventures. Also, capabilities developed in phase 1 of transformation can become core competencies that redefine the original business.

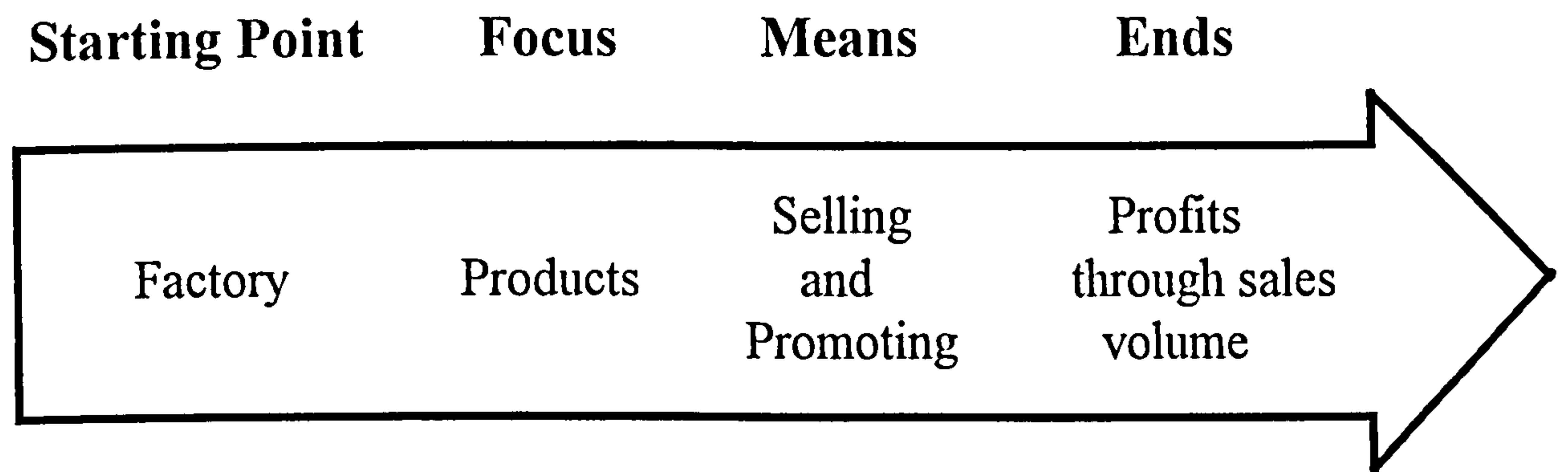
A business transformation project has a different aim from that of business process reengineering: the creation of new business opportunities. To achieve that, this methodology should be linked to marketing activities for assuring that the new opportunities address the trends of the marketplace.

Another issue related to business process reengineering has to do with the necessity of the use of information technology to support the relevant arrangements. Davenport *et al* [75] consider that information technology has to be used in any redesign effort. Norris [26] views the use of information technology as complementary to business process reengineering and not as a prerequisite.

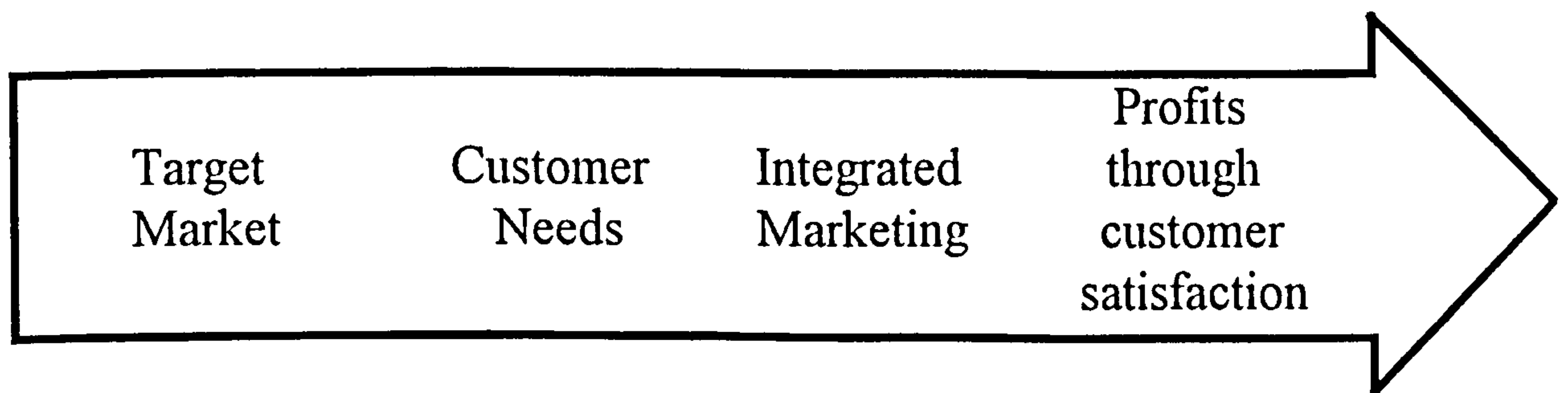
McCarthy *et al* [82] explain that, to meet objectives like efficiency in terms of cost, quality, response and flexibility, the introduction of advanced technology is no longer adequate for the degree of improvement required and emphasizes the critical role of the establishment of customer driven operational goals and process integration. They also underline that SMEs refrain from undertaking such programs because of their impression that information technology is necessary and their fear of the relevant cost and explain how an SME adopted a reengineering change initiative, by modelling and designing manufacturing systems using perspectives that include: functions, information, decisions and time.

The thesis author's opinion is that information technology enhances the results of a business process reengineering effort but it is not a prerequisite in general terms.

FIGURE 1/2
The Selling and Marketing
Concepts Contrasted (*)



(a) The selling concept



(b) The marketing concept

(*) Source: Kotler [9]

FIGURE 2/2

ISO / CD1 9001 : 2000

The Quality Management Process Model

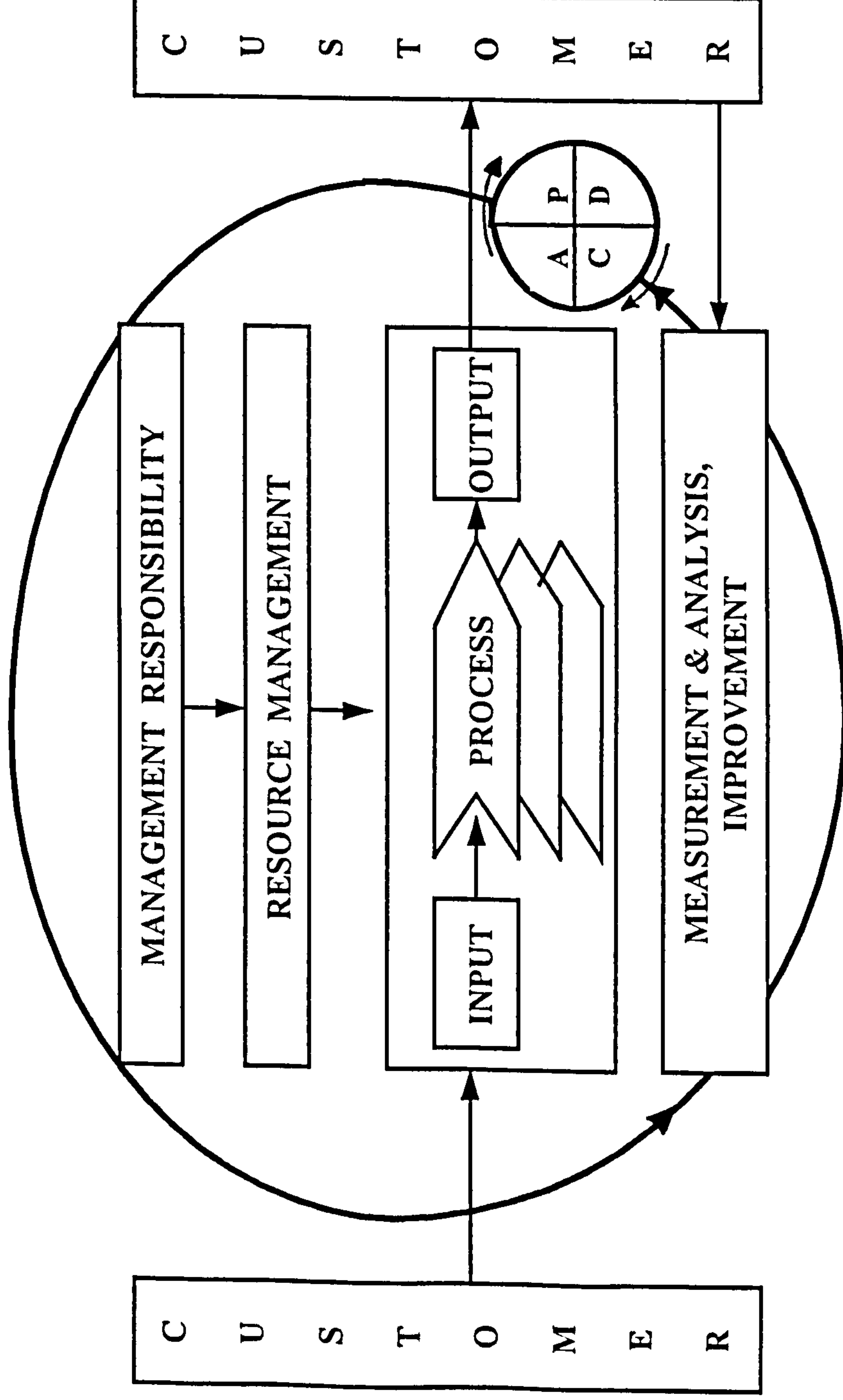


FIGURE 3/2
BS 8800 : 1996
Elements of successful Health and Safety Management based on the approach in ISO 14001 : 1996

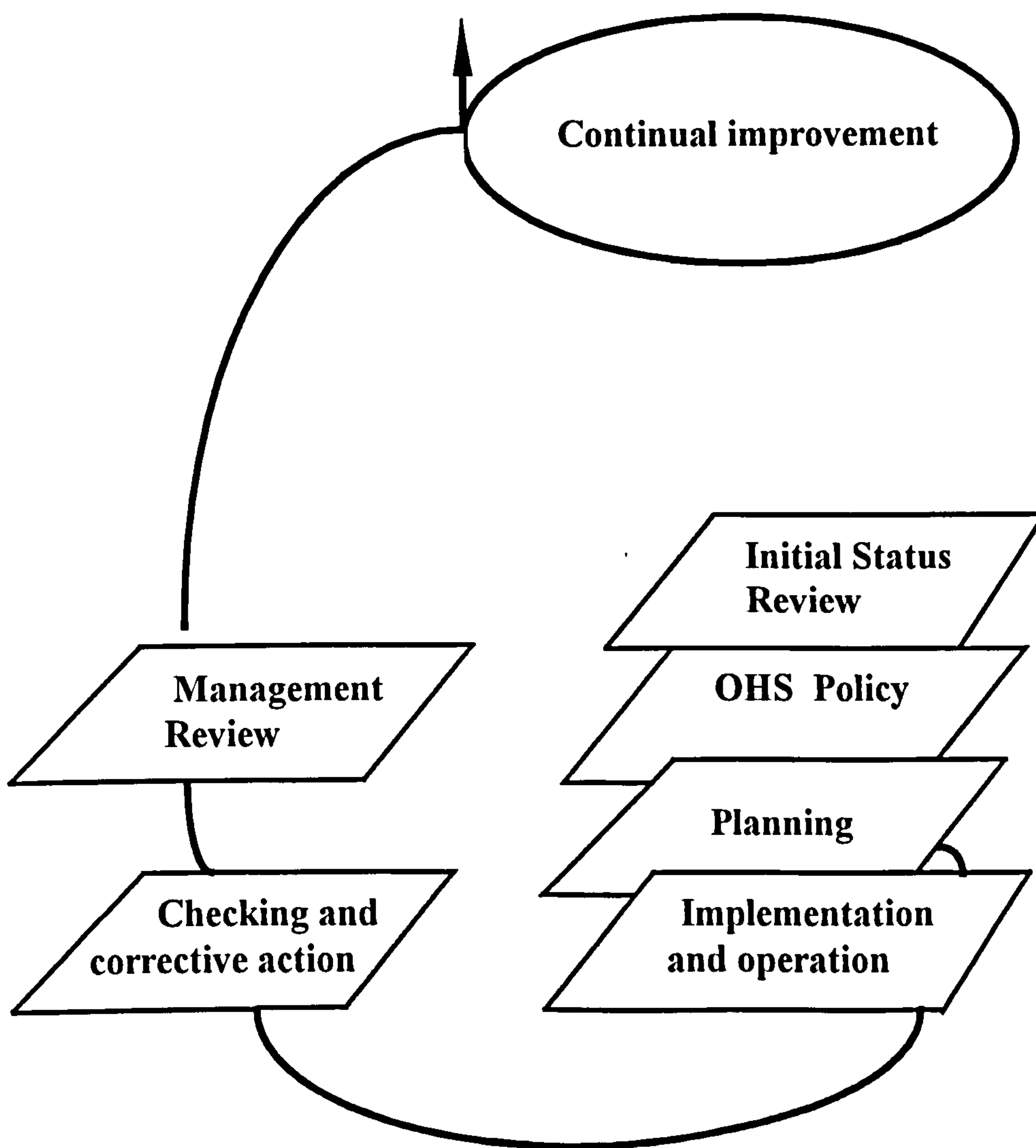


FIGURE 4/2
ISO 14001 : 1996
Environmental Management System Model

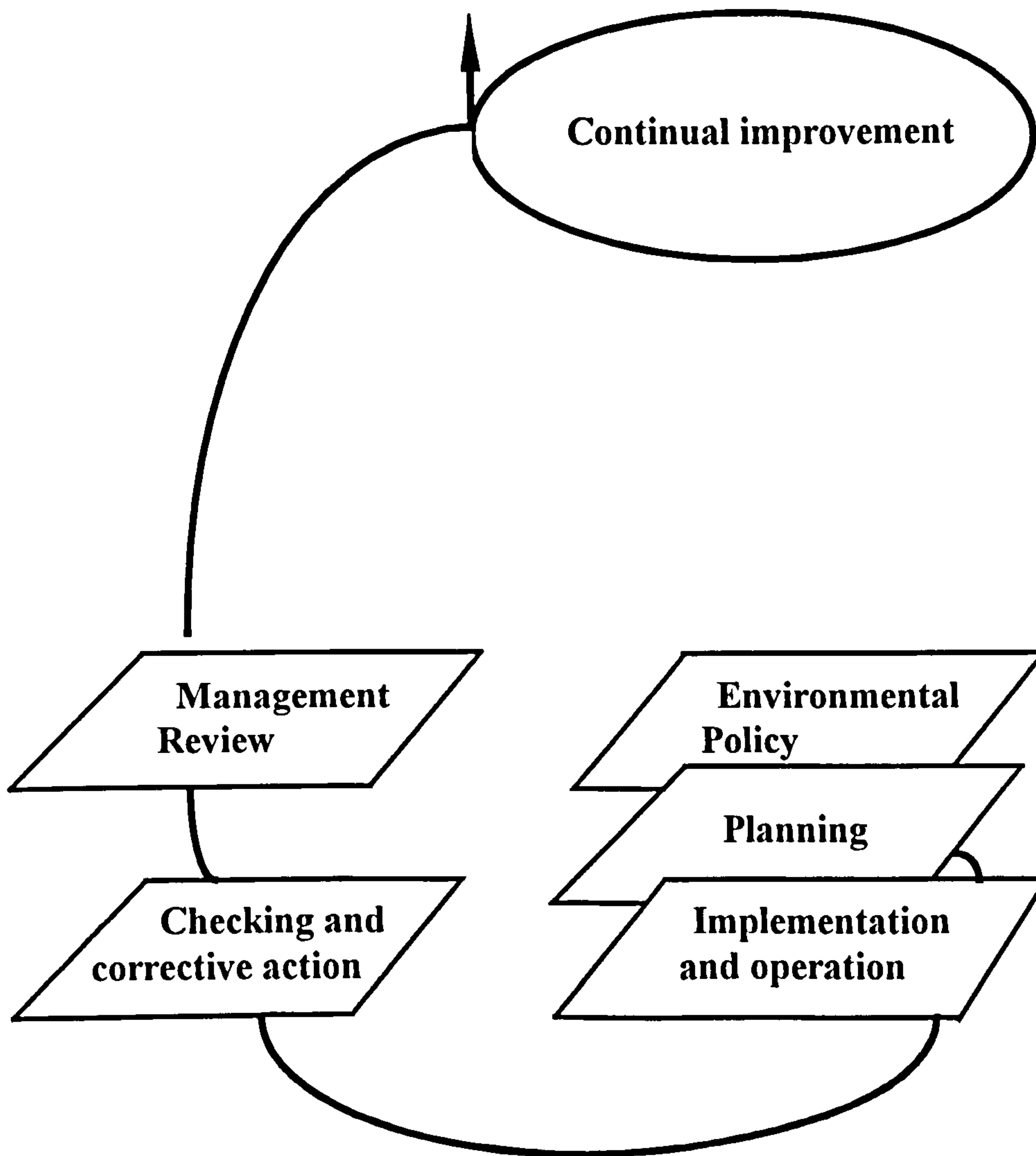


FIGURE 5/2

A model for the integrated structural basis of Quality, Safety and Environmental Management Standards (ISO 9001:2000 - BS 8800:1996 - ISO 14001:1996)

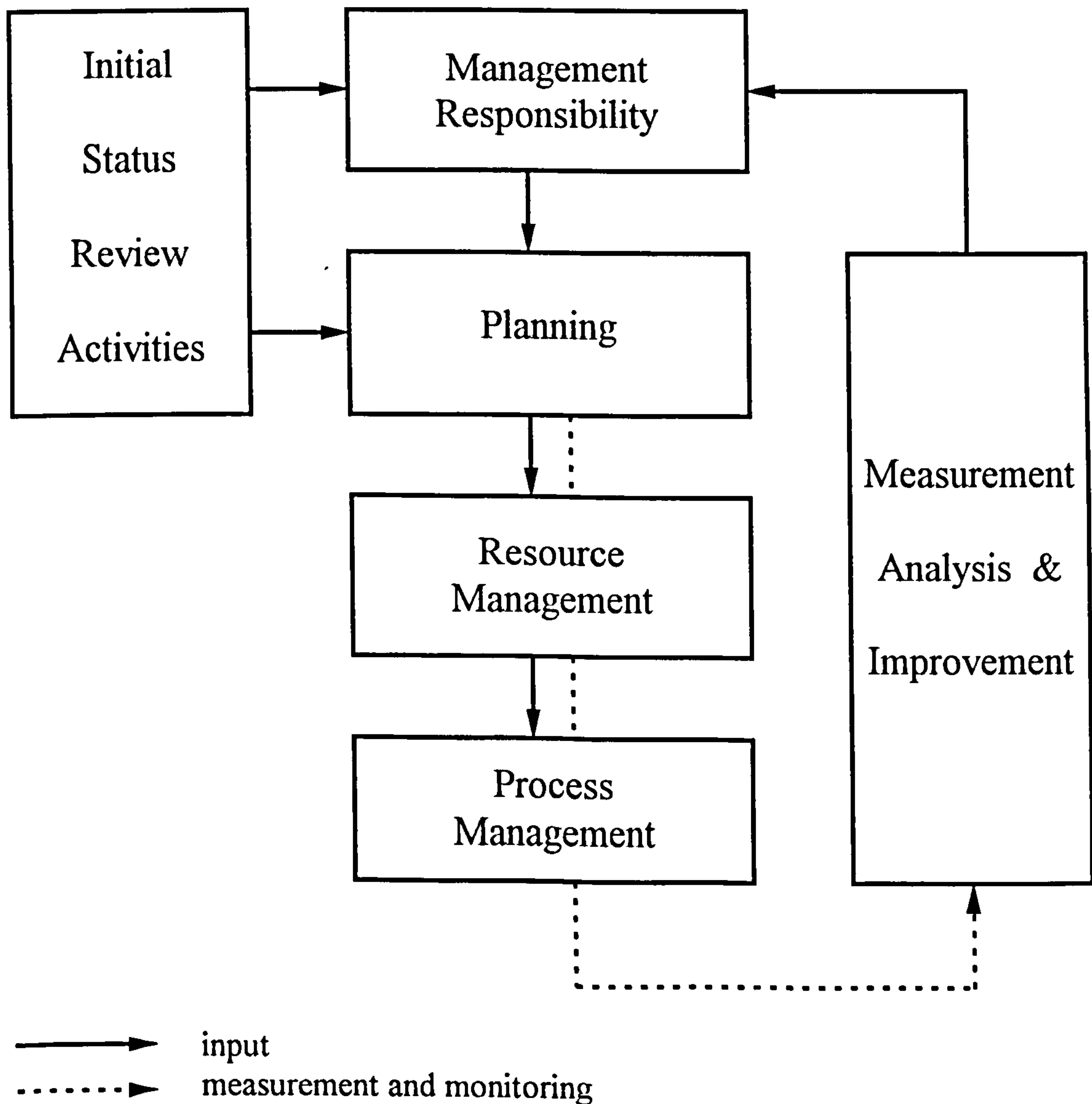
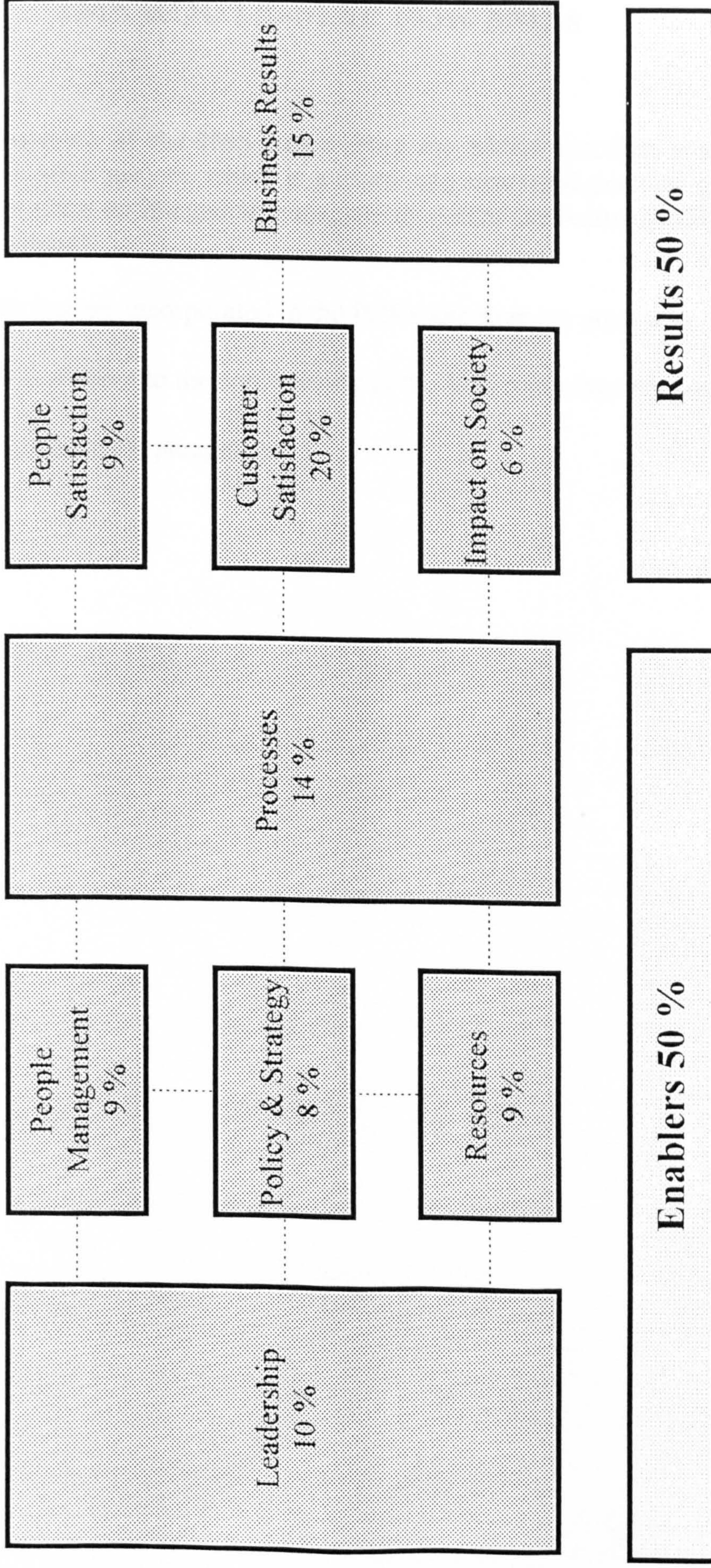


FIGURE 6/2

The Business Excellence Model



CHAPTER 3: PRESENTATION OF THE IMS ROUTE-MAP FOR SMEs

Chapter 3: Presentation of the IMS Route-Map for SMEs describes analytically the output of the research project, which is a route-map structured practical guide for SMEs to use to introduce an integrated management system (including quality, safety and environmental issues).

The particular tools that are incorporated in the IMS route-map are presented.

Finally, guidelines in relation to the applicability of the IMS route-map are provided.

Chapter 3 consists of three (3) paragraphs.

3.1 Detailed Description of the IMS Route-Map

The development and final form of the IMS route-map were determined by the following issues:

1. The integrated basis of quality, safety and environmental management standards (see 2.2.5)
2. The results of data collection procedure that are related to the way quality management systems are implemented to SMEs
3. The SMEs special characteristics and needs, as they were resulted from the data collection procedure and the relevant literature review.

Referring to issue 3 and as it can be seen in 2.1.6, where the SMEs needs for survival and development are presented, the most critical issue for these organizations is the adoption and establishment of a management systems approach. The key elements of the management systems approach are outlined below:

- Emphasis is given on proactive arrangements instead of reactive ones. Such arrangements are the development of documentation, the cause analysis and risk assessment activities, the establishment of internal process standards etc.
- Effort is made to achieve organizational objectives “by design”. This means that the achievement of organizational objectives should be assured from the phase that the relevant activities are designed and planned.
- Issues should be managed and carried out using procedures, methodologies and techniques defined by the organization and not according to the personal thoughts and ideas of certain individuals.
- Tools and mechanisms should be established for follow-up activities to take place.
- Evaluation and review activities should be based on quantitative and qualitative data. The latter kind of data should be as less subjective as possible.

The IMS route-map for SMEs has been properly designed to meet this approach. Its structure, illustrated in figure 1/3, is based on a balanced combination of management arrangements and tools. The latter have been developed to serve the specific needs of SMEs and to fit the overall IMS route-map mechanism (see 1.4.2).

Before starting the detailed description of the IMS route-map and for facilitating this description and also the description of the tools of the IMS route-map (see paragraph 3.2), three (3) terms must be defined:

- The term “manager” signifies the individual who represents the top management of the organization. This individual may be the owner or the general manager of the SME and is the one who makes decisions.

- The term “**function**” signifies a totality of activities related to certain operational needs of the organization. A function may be related to a number of processes and may be part of a department or represent a department.
- The term “**work position**” signifies a distinct role (to be played by an employee) within a function, department or the whole organization. This role is defined by certain responsibilities, proper authority and a framework of activities. In SMEs, employees usually hold more than one work positions. A work position may have a wider effect than process ownership.

STEP 1 DIAGNOSIS OF SME EXISTING SITUATION - DETERMINATION OF SHORT / MEDIUM / LONG TERM OBJECTIVES

Beginning from a diagnosis of SME existing situation is a requirement of the integrated basis for quality, safety and environmental management standards, set under the title “Initial Status Review Activities”. In addition to that and as the data collected from quality consultants showed, the phase of a diagnostic study is always the first phase in a quality management system implementation project.

Diagnosis of SME existing situation is described by the following activities:

1. The manager determines a team of individuals selected from the personnel of the SME. The task of this team is to examine the existing situation of SME’s:
 - personnel
 - activities and / or processes
 - business results.

This examination may not be exhaustive, because the available data may not be adequate or sound. In any case, an overall outline of the existing situation will be determined, based on the currently available data. The manager conducts and directs the team during this examination.

2. The selection of individuals that will participate in the team mentioned above is based on the following criteria:
 - their knowledge of the core business activities of the SME
 - their communication skills

The manager will clearly explain them the whole effort of the organization for the implementation of a management system that integrates quality, safety and environmental management activities, before they start their examination. If needed, an external specialist may be appointed to provide a brief training to the team.

3. The examination of the existing situation of the SME in relation to personnel covers:
 - the level of clarification of roles, responsibilities and authorities among personnel
 - the adequacy of competencies and skills of personnel

- the way that organization deals with training issues, in terms of identification of training needs, selection of training programs, allocation of financial resources and evaluation of the results of training programs.
- the rate of personnel satisfaction from the remuneration packages
- the culture of personnel
- issues of communication among personnel
- the existence of any kind of personnel appraisal arrangements
- the adequacy of number of personnel

4. The examination of the existing situation of the SME in relation to activities and / or processes covers:

- the content of activities and / or processes
- the level of complexity of activities and / or processes
- the cost-effectiveness of activities and / or processes in general terms
- the existing documentation for the way activities and / or processes are carried out
- any legal or other obligatory regulation related to activities and / or processes

It must be mentioned that this examination does not require a process analysis because it aims at clarifying an existing situation and not at designing action plans.

5. The examination of SME existing situation in relation to business results covers:

- financial results
- operational cost
- sales results
- qualitative results that may be determined, e.g. customer satisfaction rate, image of organization etc.

The involvement of the manager in this examination is continuous, because he is the person who ultimately deals with business results and makes relevant decisions.

As soon as the diagnosis of SME existing situation has been accomplished, the manager, in cooperation with the team, establishes specific and measurable **short, medium and long term overall objectives** for the organization. These objectives should address all of the three (3) areas of the examination that was carried out (personnel, activities and / or processes, business results).

Short term objectives are related to immediate organizational needs and mostly refer to the area of business results. Medium and long term objectives refer to all of the three (3) areas of examination and are determined by an **initial business strategic direction** that should be processed and established by the manager and the team, taking under consideration:

- the SME position in the marketplace
- the overall circumstances of the marketplace
- the SME perspectives in a realistic basis

It should be underlined that this may be the first attempt of the SME to thing and act in terms of strategic direction. For this reason, the establishment of it may be generic and

immature. This does not change the significance of the attempt and of its necessity for the implementation of the IMS route-map.

The final output of this first step is the **baseline document**. This document includes:

- the results of the diagnosis of SME existing situation
- the short term overall objectives of the SME
- the established business strategic direction
- the medium and long term objectives of the SME, linked with the established business strategic direction.

The baseline document is prepared by the above mentioned team in cooperation with the manager who finally approves it. Function leaders of the SME get informed about the content of the document and may participate in the final stage of its preparation. Progressively, all personnel access the document, as the IMS route-map implementation proceeds.

The baseline document can be considered as the framework for the development of the IMS. It is also a valuable aid for setting an organizational structure to the SME.

The preparation of the baseline document is the **first milestone** of the IMS route-map.

STEP 2 ESTABLISHMENT OF A WIDE IMS POLICY - SET IMS OBJECTIVES

The core element of this step is the top management involvement to IMS. The activities described below should be undertaken primarily by the manager of the SME, in cooperation with other individuals when needed.

1. The manager appoints an individual to be the **IMS representative** of the organization. This individual should be adequately trained in the areas of quality, safety and environmental management and must have sufficient knowledge of the relevant management systems standards. The IMS representative should be an employee of the organization and not an external specialist, and reports to the manager. If the organization does not already have an individual ready to take this position, a new employee should be hired. If the IMS representative is an existing employee of the SME, an external specialist could be hired, if needed, for additional support. If the IMS representative is a new-hired employee specialized in the relevant areas, a sufficient amount of time must be allocated for that person to learn well the operational activities of the SME.
2. The following list outlines the responsibilities of the IMS representative:
 - coordinating the IMS route-map tools implementation
 - assuring that quality, safety and environmental management systems standards requirements are fully met and also that legal and other regulatory obligations in relation to the IMS parameters are fulfilled
 - coordinating the preparation of the IMS documentation and carrying out documentation control activities

- communicating the IMS policy throughout the whole organization
- facilitating the internal communication in terms of the IMS route-map implementation
- linking the manager with the IMS activities
- designing and coordinating internal audits
- carrying out the necessary communication with Certification Bodies (when the SME is ready to be certified against ISO 9001:2000 and ISO 14001:1996)

There are specific tasks of the IMS representative that are related to the IMS route-map tools. These tasks are described separately for each tool in paragraph 3.2.

3. The manager, in cooperation with the IMS representative, establishes a **wide IMS policy statement**. The word “wide” indicates that this statement will include the establishment of organizational mission and vision in relation to IMS parameters and present the IMS policy as a resume of a system of organizational values. It should be clarified here that the establishment of mission, vision and values system will take place **through** the IMS parameters, aiming at evolving to a more generic form after the IMS is fully implemented and balanced. The establishment of the wide IMS policy statement gives the manager the opportunity to think about the organization more deeply and to adopt the quality, safety and environmental management principles. As soon as the wide IMS policy statement is communicated to all personnel, the commitment of the manager to those principles will be fully demonstrated, strongly influencing the personnel.
4. The wide IMS policy statement should be focused on the following points:
 - the top management commitment to quality, safety and environmental management principles, as they are determined in the relevant management system standards
 - the top management intention to adopt those principles to the overall business practices
 - the fact that the mission of the organization is the sustained satisfaction of all interested parties (customers, employees, stakeholders, suppliers and society) and that its vision relies on the continuous increase of the rate of their satisfaction through the continuous improvement of the organizational performance
 - the set of IMS objectives for the implementation of the IMS policy

The manager, in cooperation with the IMS representative and all function leaders, sets the **IMS objectives** and the relevant targets, which must be clear and measurable as much as possible. For the determination of the IMS objectives, the short, medium and long term objectives are taken under consideration. The rate of connection between the IMS objectives and the overall objectives of the organization is defined as “**convergence rate**”.

The convergence rate is an **internal metric mechanism** of the IMS route-map, indicating how the IMS performance influences the overall performance of the SME. This indication is related to the maturity of the IMS, considering that as the IMS

incorporates an increasing range of organizational activities and its scope is broadened, the convergence rate is gradually approaching 100 % and the IMS more and more becomes the unique management system of the organization. It should be underlined that in the initial phases of the IMS operation, the convergence rate may be estimated in a qualitative basis. As the performance monitoring systems get improved, this estimation will become more precise.

The activities of this step, as it is mentioned above, focus the extensive involvement of top management, which is the **second milestone** of the IMS route-map.

STEP 3 PEOPLE INVOLVEMENT AND INITIAL TRAINING - IMPLEMENTATION OF THE MI TOOL

This step includes:

- activities related to the people involvement and
- the activation and implementation of the “Marketing Integration” (MI) tool,

that may take place simultaneously.

The activities related to people involvement are as follows.

1. An internal training program for all personnel is designed by the IMS representative, who cooperates with the manager and the function leaders. The aims of this training program are:
 - to inform personnel about the content of IMS and the principles and special issues related to the IMS parameters (quality, safety and environmental management), for ensuring personnel awareness and minimizing their resistance to change
 - to introduce personnel to the concepts of the management systems approach, which is of crucial importance for the success of the IMS route-map implementation
 - to explain to personnel the steps that will follow for the implementation of the IMS and clarify the significance of their contribution
 - to promote communication among personnel within the framework of the IMS
2. The implementation of this program must be tailored to the particular characteristics of the SME. A proposed way is outlined below:
 - ⇒ Small cross-functional teams are determined by the IMS representative.
 - ⇒ Open training takes place in a conversation form, allowing people express not only their opinions, but their feelings as well.
 - ⇒ The IMS representative is the basic trainer, with the contribution of function leaders who act more like trainers and less like trainees (in case of training related to specific safety issues, the contribution of function leaders is more extensive). An external trainer may be used, as a complementary presence in the overall training program.

⇒ The manager will play both the roles of trainer and trainee in selected stages of the training program.

During the implementation of the training program, the IMS representative will continuously evaluate and monitor its visible results and make alterations if needed.

3. The IMS representative, in cooperation with all function leaders, determines the roles, responsibilities and authorities of all personnel, in relation to the IMS parameters. The determination should be carried out in a way that would give employees the opportunity to realize their own contribution to the IMS and the significance of that contribution. These issues, together with the relevant particular IMS targets, are documented as much analytically as possible in IMS job description sheets and are delivered to personnel to review them. Any remarks or objections are discussed and solved. The final IMS job description sheets are approved by the manager. Obviously, effort has to be made for this documentation to progressively integrate the totality of personnel activities, if this cannot happen when it is initially prepared.
4. An appraisal system in relation to the IMS targets will be developed by the manager and communicated to all personnel. This system will be realistic, considering the financial resources of the SME, but in any case, the following issues should be assured:
 - the personnel must feel that their efforts are recognized
 - the personnel must be empowered to enhance their efforts and contribution to the IMS objectives and targets achievement.

The details for the implementation of the MI tool are presented in 3.2.1. It must be mentioned that the MI tool implementation is linked with the people involvement activities (especially the internal marketing arrangements) and it contributes to the cultural change of personnel. For these reasons, its implementation may take place during the people involvement activities, in a complementary relationship.

This step ensures people awareness and leads to the establishment of effective systematically designed communication mechanisms. These achievements, together with the fulfillment of the specific aims of the MI tool, as they are described in 3.2.1, are the **third milestone** of the IMS route-map.

STEP 4 IMPLEMENTATION OF THE QSE TOOL - IMPLEMENTATION OF THE L TOOL - IMPLEMENTATION OF THE IC TOOL

The step includes the activation and implementation of the following three (3) tools:

- the “Quality, Safety, Environmental Functions of Processes and Locations” (QSE) tool
- the “IMS Logistics Parameters” (L) tool
- the “Internal Complaints Review System” (IC) tool

These tools are related to planning and operational activities and processes and may be simultaneously implemented.

The details for the implementation of the QSE, L and IC tools are presented in 3.2.2, 3.2.3 and 3.2.4 respectively. Especially the implementation of the IC tool results, among others, to communication improvement, so it may start earlier, providing input for the activities of the MI tool implementation.

This step leads to:

- the preparation of action plans and documentation needed for the IMS to meet the requirements of quality, safety and environmental management standards and of legal and other obligatory regulations and also to serve organizational needs
- the identification of personnel training needs in a job specific basis, to enable them to carry out activities effectively and to improve their competencies and their overall performance
- improvement of internal communications and problem solving methods

The fulfillment of the specific aims of the QSE, L and IC tools, as they are described in 3.2.2, 3.2.3 and 3.2.4 respectively, is the **fourth milestone** of the IMS route-map. In addition to that, the achievements of this step address to the third milestone of the IMS route-map, in relation to personnel competencies and communication mechanisms.

STEP 5 INTERNAL AUDITS - IMPLEMENTATION OF THE ISCAM TOOL

This step includes:

- implementation of internal audits and
- the activation and implementation of the “Internal System of Continuous Assessment Monitoring” (ISCAM) tool

The content of this step refers to measurement, analysis and improvement activities. As internal audits should use data resulted from the implementation of the ISCAM tool, it is proposed the first internal audit to take place after the ISCAM tool is activated, implemented and has operated for some time. The details of the implementation of the ISCAM tool are presented in 3.2.5.

The activities related to internal audits are as follows.

1. The IMS representative plans and designs internal audits. The design of internal audits is based on:
 - the results of the implementation of the QSE tool for the relative significance of quality, safety and environmental parameters to processes and locations

- the results of MI tool, in relation to causes of customer complaints and other non-compliances affecting society and / or community
- the results of the implementation of IC tool, in relation to the internal operation of the IMS
- the monitoring results of the ISCAM tool

The frequency of internal audits should be tailored to the overall situation of the SME and the progress of the IMS implementation and development. A suggested frequency for the first two (2) years is every six (6) months and after that period of time, once a year.

2. The IMS representative prepares **internal audit checklists**. These checklists are prepared every time an internal audit is going to take place, because their content has to be modified as an integral part of the internal audit design. The IMS representative selects a number of individuals who will act as the internal auditors team coordinated by him / her and informs them about:
 - the overall current situation of the IMS
 - the audit procedure to be followed
 - the way internal audit checklists should be used
 - the way the audit results should be reported

An internal audit program is prepared by the IMS representative and the internal auditors team. The program is reviewed and approved by the manager.

3. All function leaders of the SME are formally informed about the internal audit program by the IMS representative.
4. The internal audit is carried out and short meetings of the internal auditors team take place at the beginning and at the end of an audit day. During these meetings, the IMS representative gives additional guidelines to the auditors (if needed) and special issues are discussed.
5. After the internal audit has finished, the auditors team work together, coordinated by the IMS representative, to gather their individual reports for editing the final internal audit report. This report is delivered to the manager and to function leaders, as a document to be based on for designing IMS performance improvement activities.
6. A meeting takes place for designing IMS performance improvement activities and the relevant corrective and preventive actions. The meeting is coordinated by the IMS representative. All function leaders take part, whereas the participation of the manager is optional.
7. During this meeting, the following issues are processed:
 - the results of the internal audit report
 - selected data from the continuous review of the IMS effectiveness, which takes place within the framework of the ISCAM tool (see 3.2.5).

The IMS performance improvement activities are designed, documented and assigned to function leaders who agree for both the content of these activities and the time limit for their fulfillment.

8. The IMS representative informs the manager of the results of the meeting (if the latter has not taken part).

STEP 6 IMS CONTINUOUS PERFORMANCE REVIEW

This step includes:

- the **annual IMS performance review** by the top management of the SME
- the continuous review of the IMS effectiveness, which is an integral part of the ISCAM tool (see 3.2.5)

The annual IMS performance review by the top management of the SME is described below:

1. A meeting takes place, once a year, for the overall performance of the IMS to be reviewed by the top management. The meeting is coordinated by the manager and the IMS representative and all function leaders participate. The importance of the fact that the meeting is coordinated by the manager himself / herself is obvious, in relation to the enhancement and demonstration of the top management involvement.
2. During this meeting the following issues are reviewed:
 - the implementation of the IMS as a whole
 - details of the implementation of all specific activities and the tools of the IMS
 - the most important results of the internal audits
 - the most significant results taken from the operation of the ISCAM tool,**linked with:**
 - the IMS objectives that are set
 - any changes of the external environment situation affecting the IMS parameters
 - the overall performance of the SME.

The IMS representative acts as a facilitator, providing detailed information relevant to the issues reviewed, when needed. He/ she also keeps record of the meeting.

3. All function leaders express their opinions about the issues reviewed and propose improvement activities and processes that could be implemented for achieving better results.
4. Decisions are made for the improvement of the IMS performance, resulting to:
 - new action plans
 - probable changes and / or modifications of the IMS documentation and implementation practices
 - reset of the IMS objectives.

5. These decisions are properly documented and delivered to the function leaders, who should communicate them to their staff. The reset objectives will be translated to reset targets for all employees.
6. Another issue that is examined during the annual IMS performance review is the convergence rate and how it has been evolved since the last annual IMS performance review. The result of this examination indicates the rate of management systems integration and helps top management make decisions of any measurement that should be taken to improve this rate, if its level is not satisfactory. This result serves also the needs of the implementation of the ISCAM tool whose mechanism addresses to the convergence rate (see 3.2.5).

It must be underlined that the annual IMS performance review is a different activity from the operation of the ISCAM tool, having a complementary role to the latter. The ISCAM tool aims at continuously monitoring the IMS performance, whereas the annual IMS performance review checks the overall framework of the IMS and the rate of the organizational management systems integration, through the internal metric mechanism of the IMS route-map, which is the convergence rate.

3.2 Particular Tools of the IMS Route-Map

The following five (5) particular tools of the IMS route-map:

- the «Marketing Integration (MI)» tool
- the «Quality, Safety and Environmental Functions of Processes and Locations (QSE)» tool
- the «IMS Logistics Parameters (L)» tool
- the «Internal Complaints Review System (IC)» tool
- the «Internal System of Continuous Assessment Monitoring (ISCAM)» tool

are analytically presented here. A partial implementation of the tools took place in SMEs A and C (see table 1/1) and the results are presented in Appendix C.

3.2.1 Marketing Integration (MI)

Introduction

The Marketing Integration (MI) tool is based on the concept of integrated marketing, defined by Kotler [...] as the result of a situation in which all the departments of a company work together to serve the customer's interest.

The design and implementation of a tool related to marketing is of critical importance for SMEs, where:

- poor marketing activities take place
- the selling concept of marketing is adopted (see 2.1.4 and figure 1/2)
- customer satisfaction is an imperative for their survival and development

The implementation of the tool contributes to achieving a culture change in SMEs, acting as a communication catalyst between the organization and the external environment and also internally to the organization. It also provides arrangements for the establishment of a sufficient marketing function in SMEs.

It should be underlined that, based on the significance of the customer's role as it is also indicated in the quality management process model (ISO 9001:2000 standard), the marketing function not only determines the customer requirement but should carry out the overall «quality control» as well. Its efficiency may determine the efficiency of the whole organization.

Aims of the Tool

The aims of the tool are:

- to establish and develop a sufficient marketing function in SMEs

- to broaden the sales activities carried out in SMEs
- to facilitate internal and external communication
- to coordinate the way that external information related to quality, safety and environmental issues (including the customer requirements, the competitors offers, issues related to social needs and concepts, new or changed legislation, new standards, good management practices implemented in other organization, technology matters etc.) is transferred and communicated inside the organization
- to support intensively the culture change effort among all employees of the organization
- to improve the existing interface between SMEs and the overall external environment
- to enhance the concept of social responsibility in SMEs

Standards Requirements Met by the Use of the Tool

The arrangements and activities resulted from the use of the tool enable SMEs to meet the following standards requirements (according to the integrated basis of quality, safety and environmental management standards as it is presented in 2.2.5):

- Referring to the element of *Management Responsibility*, the requirement for definition of customer requirements and of safety and environmental performance acceptable levels is met.
- Referring to the element of *Resource Management*, the requirements for human resources awareness and access, maintenance and protection of necessary information are met.
- Referring to the element of *Process Management*, the requirements for managing processes related to internal and external communication, processes related to customers and other interested parties and processes related to design and development are met.
- Referring to the element of *Measurement, Analysis and Improvement*, the requirement for measurement of customer satisfaction and reactive measurement of safety and environmental performance is met.

Tool Description and Output

Figure 2/3 illustrates the concept of the way the MI tool operates. A marketing function carries out:

- internal marketing activities
- external marketing activities, addressing:
 - ⇒ existing customers
 - ⇒ lost customers
 - ⇒ potential (new) customers

and also to these three (3) groups as a whole.

As it is indicated in the relevant figure, the external marketing activities begin from the marketing function but, when they meet the three (3) groups mentioned before, they have been enhanced by the contribution of the overall organization. This contribution is the result of the internal marketing activities.

For achieving the implementation of the MI tool, the marketing function should have a technical orientation, in addition to its pure marketing mentality, because the issues of satisfying the safety, environmental and quite often quality performance requirements and communicating the relevant information cannot be managed otherwise.

An analytical presentation of the internal and external marketing activities that should be designed, documented and implemented in the framework of IMS follows.

1. Internal Marketing Activities

Internal marketing activities include:

- creation of a customer focused culture among all employees of the organization through the sufficient communication of the importance of customer satisfaction and the presentation of the fully analyzed customer requirements, needs and expectations
- analysis and presentation of the causes of customer complains to all employees of the organization, after a spherical investigation of these causes and determination of the customer satisfaction level
- examination and presentation of the society and / or community satisfaction level in relation to the activities of the SME to all employees and determination of activities that may lead to its improvement; analysis and presentation of the causes of non-compliances leading to society and / or community dissatisfaction
- examination and evaluation of the employee satisfaction level and determination of activities that may lead to its improvement (including health and safety parameters)
- investigation and provision of any new or changed standards and / or legislation relative to quality, safety and environmental issues
- determination of the need for new product or service design and development
- development of communication channels between the SME health and safety committee and the top management and personnel, in order to enhance its role and achieve a fruitful cooperation; empowerment of the SME health and safety committee, in order to activate it for the benefit of the entire organization
- introduction and communication of information related to safety and environmental issues to all employees
- contribution to the employee awareness in relation to safety and environmental management issues

2. External Marketing Activities

External marketing activities include:

⇒ In relation to existing customers:

- assurance of customer satisfaction from the order taking phase, through a full and clear interpretation of requirements, needs and expectations
- maintenance of an open communication with customers in a continuous basis
- immediate response to any customer complaint
- continuous assessment of the level of customer satisfaction (in synergy with the ISCAM tool presented in 3.2.5)

⇒ In relation to lost customers:

- analysis of the reasons that led to losing customers
- initiating corrective and preventive action
- communication with lost customers in a continuous basis and demonstration of the corrective and preventive actions taken

⇒ In relation to potential (new) customers:

- development of efficient information exchange and communication channels throughout the whole marketplace
- preparation of marketing surveys
- identification of anticipated customer requirements
- development of systematic communication activities with competitors

⇒ In relation to the above three (3) groups as a whole:

- determination of the need for new product or service design and development
- demonstration of the continuously improved profile of the organization
- assurance of the society and / or community satisfaction
- development of information exchange mechanisms between the organization and the society and / or community.
- enhancement of the relationship between the organization and the society and / or community and demonstration of it throughout the whole marketplace

The **output** of this tool is a function that integrates the way of managing the quality, safety and environmental concerns of the SME in relation to the satisfaction of internal and external environment and the fulfillment of standards and legislative or other obligatory requirements.

3.2.2 Quality, Safety, Environmental Functions of Processes and Locations (QSE)

Introduction

The Quality, Safety and Environmental Functions of Processes and Locations (QSE) form a tool to be used for determining the actions that must take place in relation to processes and locations of SMEs and also planning for these actions, in order:

- the IMS to be implemented in a cost-effective way
- the legal and other regulatory requirement in relation to the IMS parameters to be met
- the quality and environmental management systems certification against the relevant international standards (ISO 9001:2000, ISO 14001:1996) to be achieved.

The implementation of this tool results to tailoring the management systems standards requirements to the special characteristics of each particular SME. This is a very important issue, especially to SMEs, where the application of standards is not facilitated by their existing organizational structure and resources availability.

Aims of the Tool

The aims of the tool are:

- to examine the relative dependence of the processes and locations of an SME on the IMS parameters (quality, safety, environmental management issues)
- to prepare lists of requirements that should be met for the SME to comply to quality, safety and environmental management systems standards and legal obligatory regulations
- to set priorities in relation to the significance of the requirements mentioned above
- to provide the necessary action plans in order the SME to effectively meet the requirements mentioned above
- to facilitate the determination of roles, responsibilities and authorities among the personnel of the SME and contribute to the modification of a suitable, efficient and effective organizational structure
- to enhance a process-oriented business mentality in the SME

Standards Requirements Met by the Use of the Tool

The arrangements and activities resulted from the use of the tool enable SMEs to meet the following standards requirements (according to the integrated basis of quality, safety and environmental management standards as it is presented in 2.2.5):

- Referring to the element of *Management Responsibility*, the requirements for the definition of roles, responsibilities and authorities and of their structural relationship

against quality, safety and environmental issues and preparation of the system documentation are met.

- Referring to the element of *Planning*, the requirements for the identifications of quality, safety and environmental aspects of processes and the allocation of resources, responsibilities and authorities needed are met.
- Referring to the element of *Resource Management*, the requirements for human resources awareness, training and competence, determination and availability of necessary infrastructure and work environment arrangements are met.
- Referring to the element of *Process Management*, the requirements for managing processes related to production and service operation activities and to emergency preparedness and response are met.
- Referring to the element of *Measurement, Analysis and Improvement*, the requirement for control of measuring, inspection and test equipment is met.

Tool Description and Output

Figure 3/3 illustrates, in a form of a flowchart, the phases and the overall mechanism of the tool. A detailed description follows.

1. Phase A - Definitions

Initially, a very precise definition of the processes and distinct locations of the premises of the SME takes place.

It must be clarified that with the term «**distinct locations**», it is meant locations:

- having different natural and technical features and
- in which different kinds of activities take place

For example, four (4) typical distinct locations of an SME's premises can be:

- open places
- offices
- production lines
- storage areas.

In paragraph 2.4, business process analysis principles and techniques are outlined, so this phase of the tool can be assisted furthermore.

When the definition of processes is carried out, a need for process redesign may be identified, in order flexibility and cost-effectiveness to be achieved. Simultaneous process redesign activities can take place, in synergy with the implementation of this tool.

2. Phase B - Identification and Linking of Elements

After processes and distinct locations have been defined, they are examined against the IMS elements (quality, safety and environmental management parameters and the

relevant management system standards, product and / or service standards, the defined customer requirements and legal obligatory regulations). The examination includes the following activities:

- identification of the dependence of processes (inputs - workflow - outputs) and distinct location on quality, safety and environmental parameters
- evaluation of their relevant dependence on the parameters mentioned above
- investigation of the links between the quality, safety and environmental management elements for each process and location.

This phase is very important in order to achieve integration in managing quality, safety and environmental parameters and to set priorities when planning.

3. Phase C - Relative Significance of Elements

The presentation of the relative significance of the three (3) IMS elements for processes and distinct locations follows. It is based on the preparation of histograms (see figure 4/3) showing the percentage (%) significance of each of the IMS elements for every process and distinct location, so the critical element(s) will be obviously determined and the QSE functions will be quantitatively formed.

The relative significance of the IMS elements for processes and distinct locations is very important for prioritizing the actions needed to be undertaken, as SMEs cannot afford to immediately implement everything. Their limited resources oblige these organizations to carefully take one step at a time and the key point is to clarify which step should be taken first.

The criteria for determining the (%) significance of the quality, safety and environmental management elements cannot be universal and depend on the special characteristics of the organization's activities. Some generic guidelines are given below.

- ⇒ If a non-conformity in the area of one (1) of the IMS elements leads to irreversible and high cost results, then the (%) significance of this element should be above 50.
- ⇒ In processes where the output is final product or service and in processes directly related to the customer, the (%) significance of the element of quality management is expected to be higher than the (%) significance of other two.
- ⇒ The (%) significance of the element of safety management can be scaled according to the risk level estimator provided in the Table D.1 of Annex D of the BS 8800:1996 standard (see Table 1/3).
- ⇒ When legal obligatory regulations determine situations related to processes or distinct locations, the (%) significance of the respective IMS element should not be less than 33,3.

It must be underlined that the guidelines given above are just indicative. The criteria for determining the (%) significance of the quality, safety and environmental management elements should be fully set by the SME, tailored to its special characteristics and other particular situations.

After the relative significance of the IMS elements has been determined for the processes, the quality, safety and environmental «points of concern» can be put in process plans, as the points where the relevant measurements and control activities should be focused.

4. Phase D - Cause Analysis

The (%) significance of the quality, safety and environmental management elements for every process and distinct location are qualitatively interpreted, by analyzing and documenting the way these elements influence the process and distinct locations. This phase is complementary to phase C and aims at qualitatively forming the QSE functions.

In figure 3/3 the box presenting phase D is put together with the box presenting phase C in the flowchart, indicating their complementary roles.

5. Phase E - Action Planning

The output of the tool, based on the above described phases, include:

- Plans for locations arrangements needed according to the requirements determined by the IMS elements and the priorities set by the relative significance histograms
- Process plans with quality, safety and environmental points of concern, to determine:
 - ⇒ process ownership
 - ⇒ measurement and control activities
 - ⇒ maintenance programs for operational machinery and equipment and also programs for control of measuring, inspection and test equipment
 - ⇒ the necessary emergency plans to be prepared
- Identification of the IMS documentation needs and plans for its preparation
- Identification of people competencies requirements and the respective training needs and plans for providing the necessary training, based on the priorities indicated by the relative significance histograms
- Determination of any other specific activities needed (e.g. procurement of equipment for meeting legal requirements related to environmental protection) and relevant plans.

3.2.3 IMS Logistics Parameters (L)

Introduction

The IMS Logistics Parameters (L) is a tool that links the IMS parameters (quality, safety, environmental management issues) with issues related to **logistics**

management (the definition of this term used in this research project is included in 2.2.4).

Logistics management issues influence the operational cost of an organization, as well as the customer satisfaction. In case of SMEs, where the cost parameters are of crucial importance, a linkage between the IMS parameters and logistics management issues can result to integrated organizational benefits.

Additionally, the environmental management is strongly related to logistics management, as it has been analyzed in 2.2.4.

The implementation of the tool, in consistency with the applied management system standards, can improve:

- the cost-effectiveness of the relevant processes
- the efficiency and effectiveness of the marketing function
- the operational planning activities of SMEs
- the environmental performance of SMEs.

Aims of the Tool

The aims of the tool are:

- to integrate the activities related to logistics management with the IMS
- to improve inventory management practices in SMEs
- to introduce a management systems approach to purchasing issues, by providing the proper arrangements and documentation
- to enhance mutually beneficial relationships with suppliers
- to introduce a management systems approach to transportation and distribution activities, by providing the proper arrangements and documentation
- to support the activities of the marketing function
- to contribute to the sufficient implementation of the environmental management standards, especially in relation to materials control issues and to suppliers evaluation
- to reduce the operational cost of SMEs

Standards Requirements Met by the Use of the Tool

The arrangements and activities resulted from the use of the tool enable SMEs to meet the following standards requirements (according to the integrated basis of quality, safety and environmental management standards as it is presented in 2.2.5):

- Referring to the element of *Management Responsibility*, the requirement for preparation of the system documentation is partially met.
- Referring to the element of *Process Management*, the requirement for managing processes related to purchasing activities and production and service operation processes are met.

Tool Description and Output

There are four (4) distinct activities to be undertaken, each of them producing **output**. Specifically:

1. Development of the Internal Distribution and Handling Map

Where applicable, standard paths to be followed for internal distribution and handling of :

- incoming products
- in-process products
- final products

are designed. Additionally, specific places for permanent and temporary storage are selected. In this way, unnecessary and non value-adding internal handling activities are reduced or may be eliminated.

For designing the standard paths and selecting the storage places mentioned above, the following issues should be taken under consideration:

- ⇒ flexibility of handling must be assured
- ⇒ the number of transitional or in-between places where products are transported and wait for their next destination must be the minimum possible.

Another issue is that, based on the QSE tool output, processes and selected locations should be very carefully studied within an overall layout of the organization, to determine:

- better solutions from the aspects of control and time
- better solutions for the quality of products
- arrangements that assure product identification and traceability
- arrangements for minimization of environmental impacts
- arrangements to cope with safety issues (e.g. solutions for handling flammable or eruptive products etc.)

Finally, an «internal distribution and handling map» can be issued (**output**), as an integral part of the IMS documentation. This document is intended to be used by all employees involved in the relevant activities and should be revised whenever any determinative change of circumstances occurs.

2. Stocks Determination

The stocks of incoming, in-process and final products should be determined (**output**), taken under consideration the ISO 9001:2000 standard requirements for processes related to purchasing activities. The determination should be based on the following issues:

- the nature of incoming, in-process and final products and how they interact with the overall environment
- the available production means
- the available storage places, their size and their technical features
- the external distribution system of the SME
- the way the marketing function of the SME operates
- the purchasing policy and status, concerning:

⇒ response speed of incoming products suppliers

⇒ number of approved suppliers for each incoming product

- financial ability of stocking (stocks are strongly related to cost and this is of a prior importance for an SME).

This activity leads to improvement of the inventory management practices of the SME and to more effective control of materials.

3. Design and Development of External Distribution and Transportation Procedure(s)

External Distribution and Transportation Procedure(s) (**output**) will be designed and developed as an integral part of the IMS documentation. The procedure(s) strongly relate(s) to customer satisfaction as they concern the final products. Issues to be examined are (the following list is not exhaustive):

- the nature and technical characteristics of products to be distributed
- all kinds of hazards during transport and / or shipping of products
- possible quality problems that can occur during transportation (e.g. packing damages etc.)
- products delivery and the relevant customer requirements
- duration of activities
- distribution and transportation means
- environmental impact of the vehicles used
- responsibilities, qualifications and training of personnel involved
- evaluation of external transportation providers.

4. Design and Development of Incoming Products Receiving Procedure(s)

Incoming Products Receiving Procedure(s) (**output**) will be designed and developed as an integral part of the IMS documentation. Issues to be examined are (the following list is not exhaustive):

- the distribution procedures of suppliers (e.g. by a specific audit)
- all kinds of hazards during receiving incoming products
- quality control of incoming products (checking quantities, macroscopic inspection, sample taking)
- environmental impact of suppliers transport vehicles in the premises of the SME
- responsibilities, qualifications and training of personnel involved

The implementation of the four (4) activities described above should be planned within the framework of the preparation of the overall IMS documentation. The training needs that will be identified should be integrated to the training plans provided by implementation of the QSE tool.

3.2.4 Internal Complaints Review System (IC)

Introduction

The Internal Complaints Review System (IC) is a tool providing an upgraded way of interdepartmental or cross-functional communication for mainly preventive, but also corrective actions to be undertaken in relation to the way that the IMS operates or is designed.

The term «**internal complaints**» that is introduced here means any report made by the employees of the SME for problems occurring in:

- internal communication paths
- operational activities
- interactions with the customers and the external environment, that have been identified by the employees of the SME.

The implementation of this tool facilitates the introduction of formal communication paths that SMEs need and also contributes to the development of a different culture among employees. Additionally, employees have the opportunity to better realize their role and its significance for the satisfactory operation of the IMS and the organizational performance improvement.

Aims of the Tool

The aims of the tool are:

- to indicate weaknesses of the IMS before they lead to non-conformity or loss
- to identify causes of the SME's performance shortcomings before they affect the customer or the external environment
- to involve more employees of all the organizational levels in the procedure of reporting problems, searching for their real cause and solving them
- to enhance the contribution of all departments and / or functions of the SMEs in the IMS effectiveness review activities
- to introduce efficient formal communication paths
- to cultivate a mentality of continuous improvement among all employees

Standards Requirements Met by the Use of the Tool

The arrangements and activities resulted from the use of the tool enable SMEs to meet the following standards requirements (according to the integrated basis of quality, safety and environmental management standards as it is presented in 2.2.5):

- Referring to the element of *Resource Management*, the requirement for human resources awareness is met.
- Referring to the element of *Process Management*, the requirements for managing processes related to internal communication, customers and other interested parties and control of non-conformity are met.
- Referring to the element of *Measurement, Analysis and Improvement*, the requirements for analysis of data related to the system performance collected for relevant sources and for the existence of improvement mechanisms are met.

Tool Description and Output

Figure 5/3 illustrates, in a form of a flowchart, the phases and the overall mechanism of the tool. A detailed description follows.

1. Completion of the «Internal Complaint Form»

Problems should be initially reported by employees to the relevant function leader. This issue is quite important for two (2) reasons:

- avoiding informality in the flow of this kind of information
- assuring that responsibilities and authorities are respected.

Practically, employees tend to report problems orally. It is of the responsibility of the function leaders to complete a properly designed form that can be called «Internal Complaint Form», describing:

- the problem and the relevant details
- the employee who reported it
- any comments he / she wants to make

The internal complaint forms are given to the SME IMS representative as soon as they are completed, who proceeds to the next phase of the tool. These forms are kept as a reference record.

2. Cause Analysis

The IMS representative collects the completed internal complaint forms and prepares a documented cause analysis for each case. The cause analysis aims at identifying the core reasons for the problem occurrence, in relation to the way that the IMS is designed and operates and, consequently, to the overall performance of the SME.

For preparing a documented cause analysis, the IMS representative is based on:

- the content of the internal complaint form
- additional data that collects by examining the situation
- the comparison between the situation and the relevant IMS arrangements

3. Introductory Points of the Internal Complaints Review Meeting

This phase is prior to the core phase of the tool which is the Internal Complaints Review Meeting. The IMS representative reviews the cases of internal complaints reported, presented and analyzed and prepares a list of introductory points for the meeting. For the preparation of this list, any decisions for immediate corrective or preventive action to IMS that were made during the previous meeting, are taken under consideration.

It must be underlined that the list of introductory points for the internal complaints review meeting should reflect the IMS policy of the organization, in terms of:

- being influenced by the mission, vision and the system of values of the organization
- aiming at the achievement of the IMS objectives
- taking under consideration the overall operational framework of the organization
- being in consistency with the quality, safety and environmental management principles determined by the applied standards.

4. Internal Complaints Review Meeting

The internal complaints review meeting takes place periodically (a proposed frequency is every one or two months). During this meeting, all cases of internal complains that have occurred in the meanwhile between the previous meeting and the current one are processed. The IMS representative presents the list of introductory points and acts as a «facilitator» for the whole duration of the meeting, trying to:

- help all participants express their points of view in relation to the issues being discussed, and especially in relation to the cause of the internal complaints
- keep the discussion within the framework of the IMS
- enhance communication among people
- clarify any possible misunderstandings
- keep the discussion within the time limits agreed among participants
- route the discussion to results

All function leaders take part to this meeting. If needed, employees involved in special cases of internal complains may take part. After a considerable number of meetings have taken place and when the operation of the tool has become satisfactorily balanced, these meetings can be open to more people.

It must be underlined that the Internal Complains Review Meeting is a core step for managing communication issues.

5. Results

The internal complaints review meetings come to three (3) categories of results which are the output of the tool:

- **Decisions for immediate corrective and / or preventive actions to IMS**

Such decisions are related to problems whose causes are obvious and can be solved directly or to very serious problems or causes of problems, the occurrence or recurrence of which may lead to significant non-conformities or losses. The corrective and / or preventive actions are agreed between all individuals involved, together with a relevant time schedule.

- **Conclusions to be reported to top management**

These conclusions are more generic and reflect the overall performance of the IMS and the whole organization. During the short meetings for the continuous review of the IMS effectiveness and design of improvement processes, that take place within the framework of ISCAM tool (see point 8 of 3.2.5), the conclusions are reported to top management as data additional to ISCAM outputs. This activity links the IC and ISCAM tools.

- **Input for indicators**

As it will be analytically presented below (see point 3 of 3.2.5), to determine the qualitative indicators for the ISCAM tool, results of the IC tool are taken under consideration. In this case, the results indicate areas of concern that should be addressed, in order to assess the IMS performance for achieving a continuous improvement of it. Also this activity links the IC and ISCAM tools.

3.2.5 Internal System of Continuous Assessment Monitoring (ISCAM)

Introduction

The Internal System of Continuous Assessment Monitoring (ISCAM) is an internal assessment system, designed to meet the needs and special requirements of SMEs and specifically:

- their need for monitoring quantified information to enable the top management to continuously assess the performance of the organization and quickly respond to emergency or rapidly changing circumstances
- their need for elimination of uncontrolled information flow caused by communication informality

ISCAM is a different assessment approach from the internal audit activities that management systems standards require and also from the seven (7) alternative self

assessment approaches provided by the Business Excellence Model, to the following points:

- ⇒ it takes place in a **continuous basis**, giving updated assessment results that can be immediately used for undertaking corrective actions and designing and implementing improvement processes, whereas the other assessment approaches give a rather static view of the management systems and organizational performance that represents only the time the assessment was carried out
- ⇒ it allows a more **dynamic interaction** to take place between the assessment results and the system and organizational performance, compared with the way the results of the other assessment approaches are submitted and exploited
- ⇒ it is focused on quantified results and evaluates the system effectiveness through them, while the internal audit activities that management systems standards require are focused on structural issues of the system to evaluate their effectiveness.

As it is mentioned in paragraph 8.3: «Analysis of Data» in the ISO 9004:2000 standard, in analysis, the overall performance should be divided into its parts to find out their nature and relationships to produce information for management decisions. Following this direction, ISCAM contributes to the production of this kind of information mentioned above, in a way suitable for SMEs.

A characteristic of ISCAM is that it works using information that already flows in the organization and, if needed it is modified for achieving full compatibility. Additional activities are avoided and they are introduced only if no information relative to key issues of the IMS is normally available.

By the use of ISCAM, the internal audit activities that management systems standards require are mostly serving assessment needs related to verification of compliance to the standards applied and other legal or regulatory requirements.

Aims of the Tool

The aims of the tool are:

- to ensure that a continuous improvement mechanism is established and operates
- to provide an assessment structure that covers all IMS areas of concern (quality, safety and environmental management issues)
- to monitor and assess the IMS performance in a daily basis against short, medium and long term objectives
- to monitor and record all IMS implementation weaknesses or faults resulting to cost increase and efficiency reduction throughout the whole organization
- to provide sound information to the top management for continuously reviewing the IMS effectiveness and immediately undertaking corrective actions and designing and implementing improvement processes
- to dramatically support the SMEs top management to make decisions
- to introduce a management systems approach to the information flow processes and to improve their efficiency

- to assess the IMS performance, reflecting the overall operational performance of the organization through the convergence rate
- to operate as an initial step for the overall integration of the organization.

Standards Requirements Met by the Use of the Tool

The arrangements and activities resulted from the use of the tool enable SMEs to meet the following standards requirements (according to the integrated basis of quality, safety and environmental management standards as it is presented in 2.2.5):

- Referring to the element of *Management Responsibility*, the requirement for top management review of the overall performance of the system from the aspects of its suitability, adequacy and effectiveness is met.
- Referring to the element of *Resource Management*, the requirement for human resources training and competence is partially met.
- Referring to the element of *Process Management*, the requirement for managing processes related to control of non-conformity is met.
- Referring to the element of *Measurement, Analysis and Improvement*, all the relevant requirements are met, except from the requirement for proactive measurement and monitoring of system performance towards quality, safety and environmental arrangements through internal audits.

Tool Description and Output

Figure 6/3 illustrates, in a form of a flowchart, the phases and the overall mechanism of the tool. A detailed description follows.

1. Information Flow Analysis

Through every function or work position within an SME, some kind of information flows. In this phase of the tool, the following questions must be answered:

- what is the nature of the information that flows through every function and work position
- what data (internal or external) is collected at every work position
- how is that data processed
- what results are taken or can be taken out of it
- which function and / or work position receives the results.

Based on the respective answers, the suitable work position that will provide input to the assessment system will be selected.

It is important to «capture» the necessary information from its origin; if possible, not to add anything in the normal workflow of employees but just to modify their work in a way that facilitates the assessment system. As it has been mentioned before, in SMEs, very often employees hold more than one work positions and there are many different tasks for them to cope with, due to the fact that the number of employees is smaller than required. In a situation like that, additional work would cause problems,

such as resistance and negative attitude of employees and, even more, their objective inability to cope with everything, leading them to failure. On the other hand, additional work that can be avoided is a non value-adding cost-raising work and SMEs cannot afford it.

2. Selection of «ISCAM Focal Points» (Work Positions)

After the identification and analysis of the information exchange circuit, the suitable work positions are selected and they can be called «ISCAM focal points», for starting up creating the tool core mechanism. Additional things have to be taken under consideration, such as:

- the existing qualifications and competencies of employees that will act as ISCAM focal points
- their needs for training, in order to efficiently act as ISCAM focal points
- the training that it is possible to be provided to them straight forward and any plans for the relevant training activities that can be prepared for the foreseeable future

3. Determination of Quantitative and Qualitative Indicators

The short, medium and long term organizational objectives set by the top management of an SME, will determine the quantitative and qualitative indicators that activate the assessment system. These indicators interpret the organization's overall objectives in a way that the latter can be continuously monitored, measured and, if needed, reset.

Quantitative indicators can be related to:

- financial issues linked with IMS parameters
- the IMS Logistics Parameters tool
- sales volumes
- customer satisfaction rate (e.g. through complaints related to quality, or environmental complaints reflecting the organization's image in community)
- credit control issues
- quality, safety and environmental non-conformities and / or losses and the relevant cost
- operational cost
- performance of employees

Qualitative indicators can be related to:

- results of the Internal Complaints Review System
- internal and external communication, reflected by the speed of cross-functional actions, the atmosphere between people in the organization and the relationship with customers, suppliers, competitors and the community
- compliance to the quality, safety and environmental management standards applied or the legal obligatory requirements.

4. Modification of the Form of Information Flowing Through Focal Points

The selection of ISCAM focal point and the determination of quantitative and qualitative indicators inevitably lead to the need of modifying the form of information flowing through the IMS focal points, in order to be in a full consistency with these indicators. Modification may include the following arrangements:

- provision of full compatibility between all elements of the information exchange circuit
- change of the processing method of incoming information
- change of the way that both incoming information and information coming out are presented.

Modification may be combined with reengineering of processes related to information flow. Reengineering of this processes can take place systematically during this phase, if the organization wishes to, leading to a more efficient and cost-effective information flow through all functions and / or work positions.

5. Transformation of Outputs

Taken under consideration the information needs of the SME top management, the properly modified information that comes out has to be transformed to specific results in a form that can allow assessment to take place in two (2) levels:

- the level of SME top management
- the level of IMS representative

More specifically, these results are presented in:

a. Daily ISCAM Data Sheet for SME Top Management

A standard data sheet will be issued daily, providing to the top management of SME the essential information for assessing the overall performance of the organization. This data sheet should contain:

- financial data (related to accounting issues, cash flow issues etc.)
- operational data
- marketing data
- data related to human resources.

Some of the data categories mentioned above are directly linked to the IMS and some other may be indirectly linked to it, depending on the organizational structure of the SME. It is obvious that, through this data sheet, the ISCAM tool contributes, as an initial step, to the overall management system integration.

b. IMS Indices for SME IMS Representative

In a daily basis, IMS indices will be monitored for enabling the IMS representative to assess:

- the effectiveness of IMS
- its compliance to the relevant standards and legal obligatory requirements
- the IMS shortcomings and the result cost increase

The determination of IMS indices depends on the nature of the organization's processes and activities and their complexity and is based on the quantitative and qualitative indicators.

The transformation of outputs may require a well designed software package. In this case, an employee having also other responsibilities can run it through. Otherwise, a full-time employee may needed to be engaged to that.

The Daily ISCAM Data Sheet for SME Top Management and the IMS Indices for SME IMS Representative are the **output** of the tool.

6. Accurate Action Plans

The SME top management can decide the preparation and implementation of accurate action plans, by using the daily ISCAM data sheet. These plans aim at immediately taking measurements for avoiding problems and pitfalls that could hold back the organization from achieving its overall objectives, mostly the short term ones. The accurate action plans:

- enable the SME top management to rapidly interfere in situations needed
- empower the front line management practices in the SME
- help the SME top management involve as much employees as possible with quick movements.

7. Immediate IMS Corrective Actions

The IMS representative reviews the daily monitored IMS indices, and has the ability to interfere in the way that the IMS operates or, even, is structured, by undertaking immediate corrective actions. These actions may be of prime or secondary importance or may address trivial points if the overall system. In all cases, they are necessary for the maintenance and the continuous improvement of IMS.

Some of these immediate corrective actions will be discussed and further analyzed with the top management in the framework of the following phase.

8. Continuous Review of the IMS Effectiveness / Design of Improvement Processes

The SME top management, in cooperation with the IMS representative, using the outputs of ISCAM, will review in a regular basis the IMS effectiveness and will design improvement processes that must be implemented straightforward. This cooperation may take place in a short meeting pattern, in which, other individuals could selectively participate. A suggested normal frequency of such short meetings is twice a week.

These reviews will ultimately address the IMS objectives. Through the convergence rate, their value is continuously extended to the short, medium and long term overall objectives of the SME.

As these reviews are carried out, observations about the suitability and utility of the determined quantitative and qualitative indicators should be made. Such observations may result to a review of the indicators and a possible re-determination of them.

3.2.6 Potential Independence of the IMS Route-Map Particular Tools

The five (5) particular tools of the IMS route-map, presented in this paragraph, have been designed in such away that, apart from the links between them and their operation in the overall framework of the IMS route-map (see paragraph 3.1), they can be independently implemented if an SME wishes so. The reasons for that are presented below:

- a. Each of the tools does not require precondition activities to take place. Of course, as it happens with any management arrangement introduced to an organization, human resources allocation is a prerequisite for the operation of the tool.
- b. Each of the tools serves specific needs of SMEs through clearly defined arrangements, activities and systems. If the management of an SME considers the implementation of a tool to be more critical for its needs than the implementation of the whole IMS route-map for a period of time, it has the opportunity to implement the tool, as adequate guidance is provided.
- c. Each of the tools produces exclusive and integral output which can support the management of the SME to their decisions and actions.

The tools could be implemented in SMEs, even if the latter do not aim at introducing an IMS and at being certified against the international management system standards, but just want to introduce a management systems approach to specific areas of their business activities.

3.3 Applicability of the IMS Route-map

The IMS route-map has been designed in such a way that it is applicable to SMEs. Adequate guidance is provided for all its steps and the mechanisms of its particular tools are fully described.

However, a number of issues, related to the **human element** must be taken under consideration, for enhancing the applicability of the IMS route-map and ensuring its positive results.

1. Any new arrangement has to be analytically explained to all employees involved before it is implemented. Explanations should be prior to questions and not following them. By this way, employee involvement begins normally and unpredictable reactions are minimized.
2. The top management has to continuously demonstrate its involvement and commitment.
3. Any positive results should be immediately demonstrated to employees for motivating them to keep on contributing to the implementation of the IMS route-map. Additionally, attitudes and activities that support the implementation of the IMS route-map should be acknowledged.

Another point that should be discussed is the **duration** of the implementation of the IMS route-map. The data collection procedure showed that the duration of a quality management system design and development project is not related to the size of an organization, but to the complexity of its activities and to its existing organizational structure. So **time scheduling** for the implementation of the IMS route-map should be fully tailored to the characteristics of the particular SME and should be based on the following issues:

- the results of the Diagnosis of SME Existing Situation (step 1 of the IMS route-map)
- the complexity of existing processes
- the resource availability
- the existing competencies of personnel.

In any case, an IMS route-map implementation schedule should be prepared and followed as much as possible.

FIGURE 1/3
The IMS Route-Map for SMEs

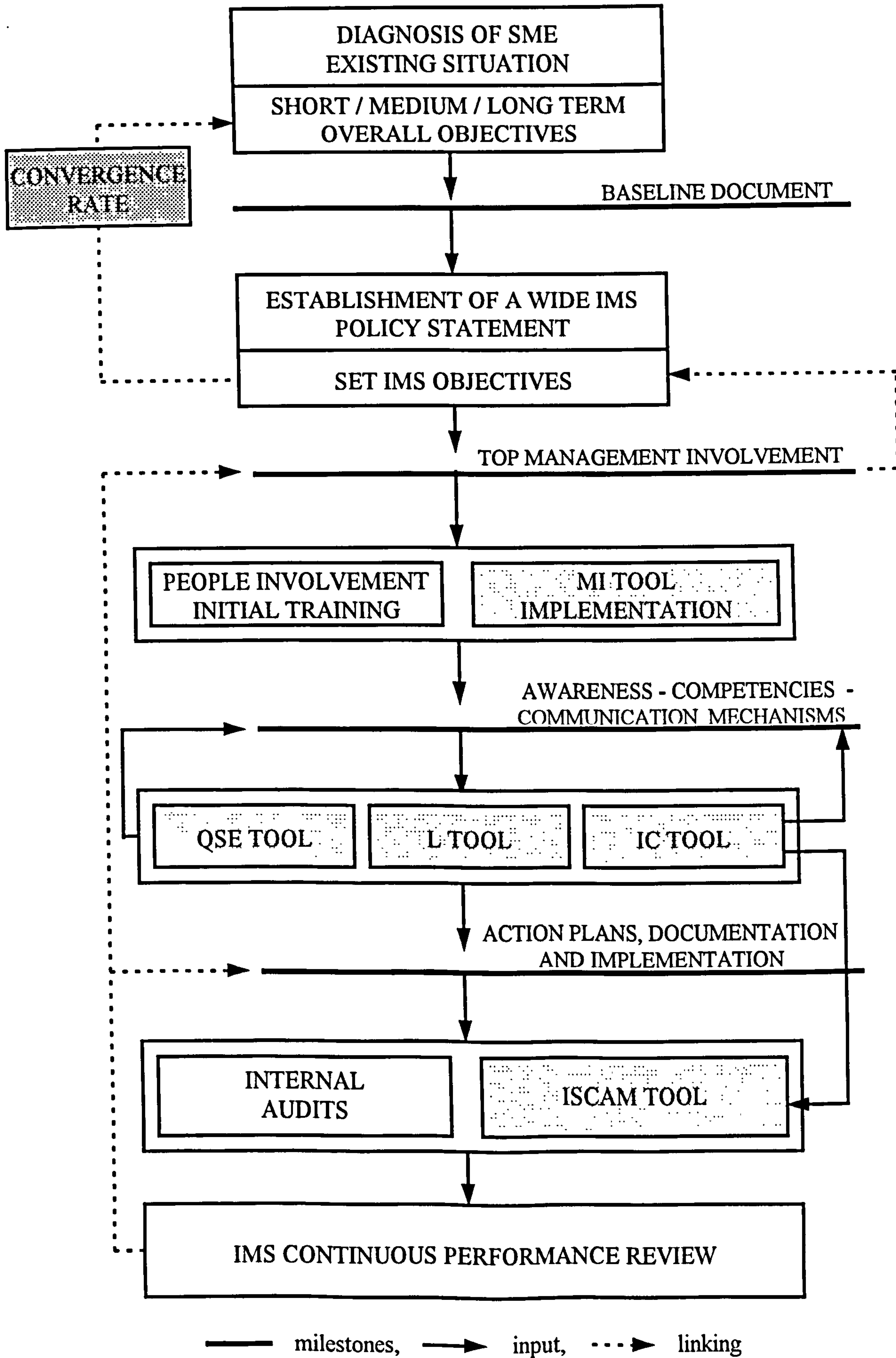
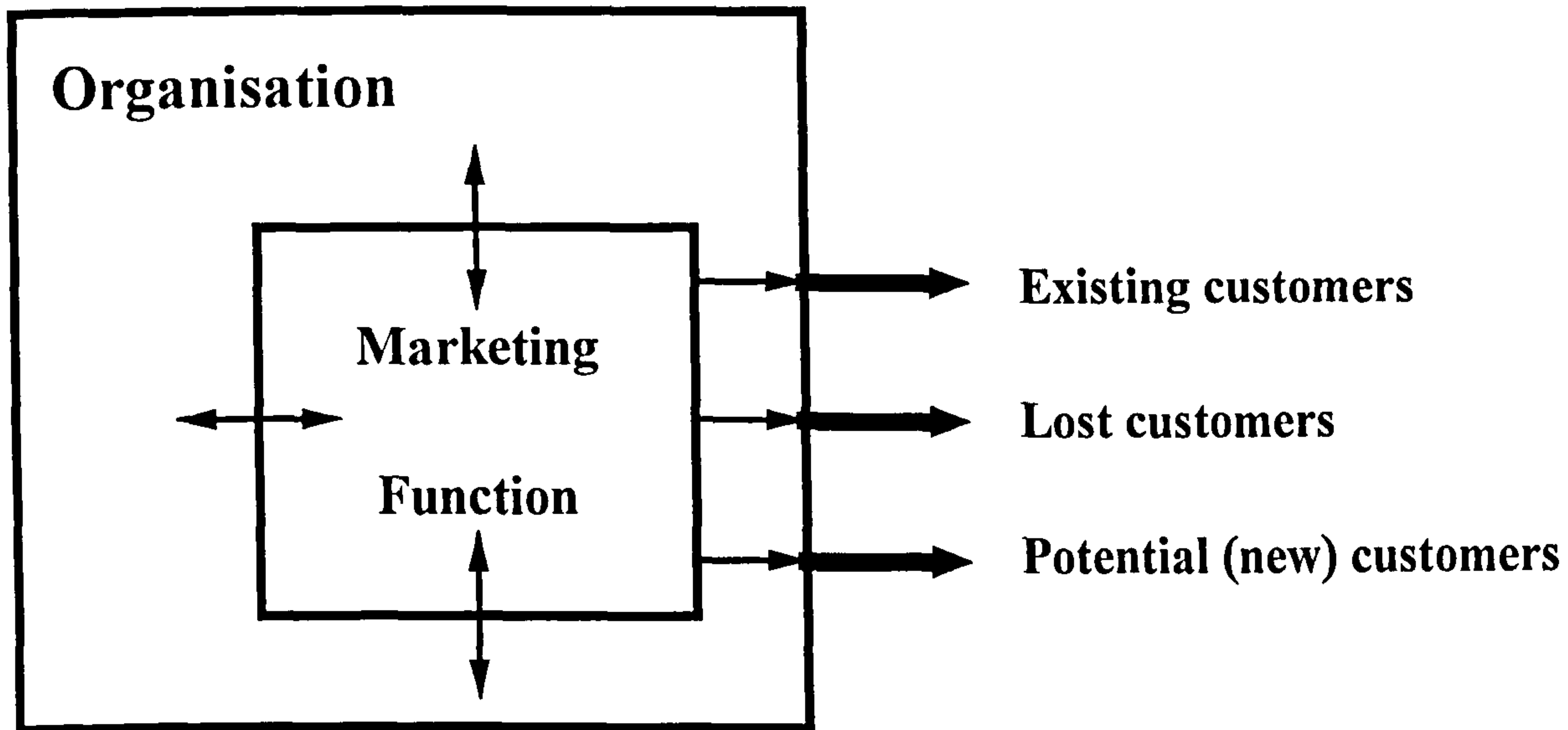


FIGURE 2/3
Marketing Integration (MI)



↔ internal marketing

→ external marketing beginning from marketing function

➔ external marketing enhanced by the contribution of the overall organisation

FIGURE 3/3
Quality, Safety and Environmental Functions of Processes and Locations (QSE)

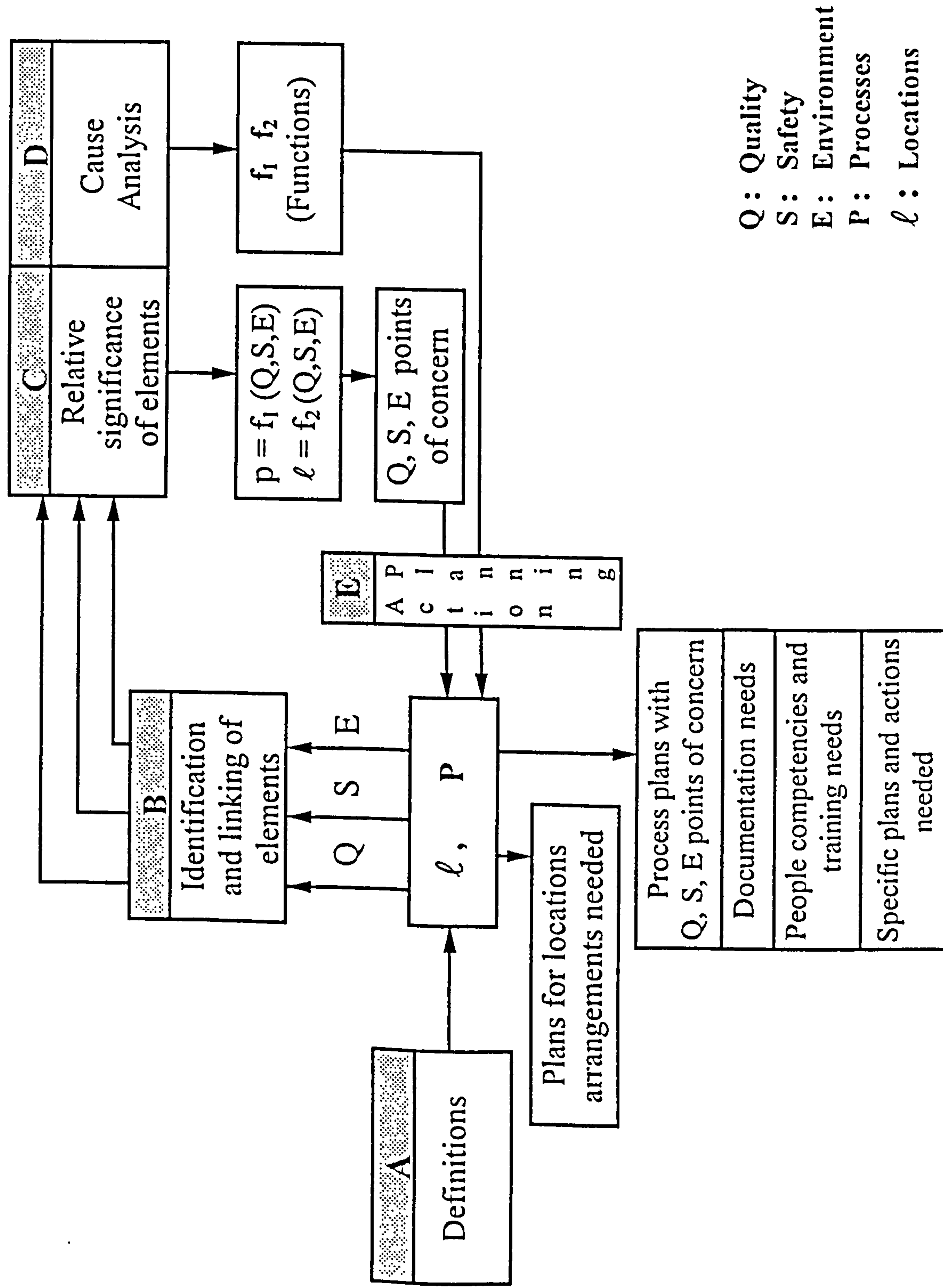


FIGURE 4/3
Presentation of Relative Significance (%)
of IMS Elements for Processes
and Locations through Histograms

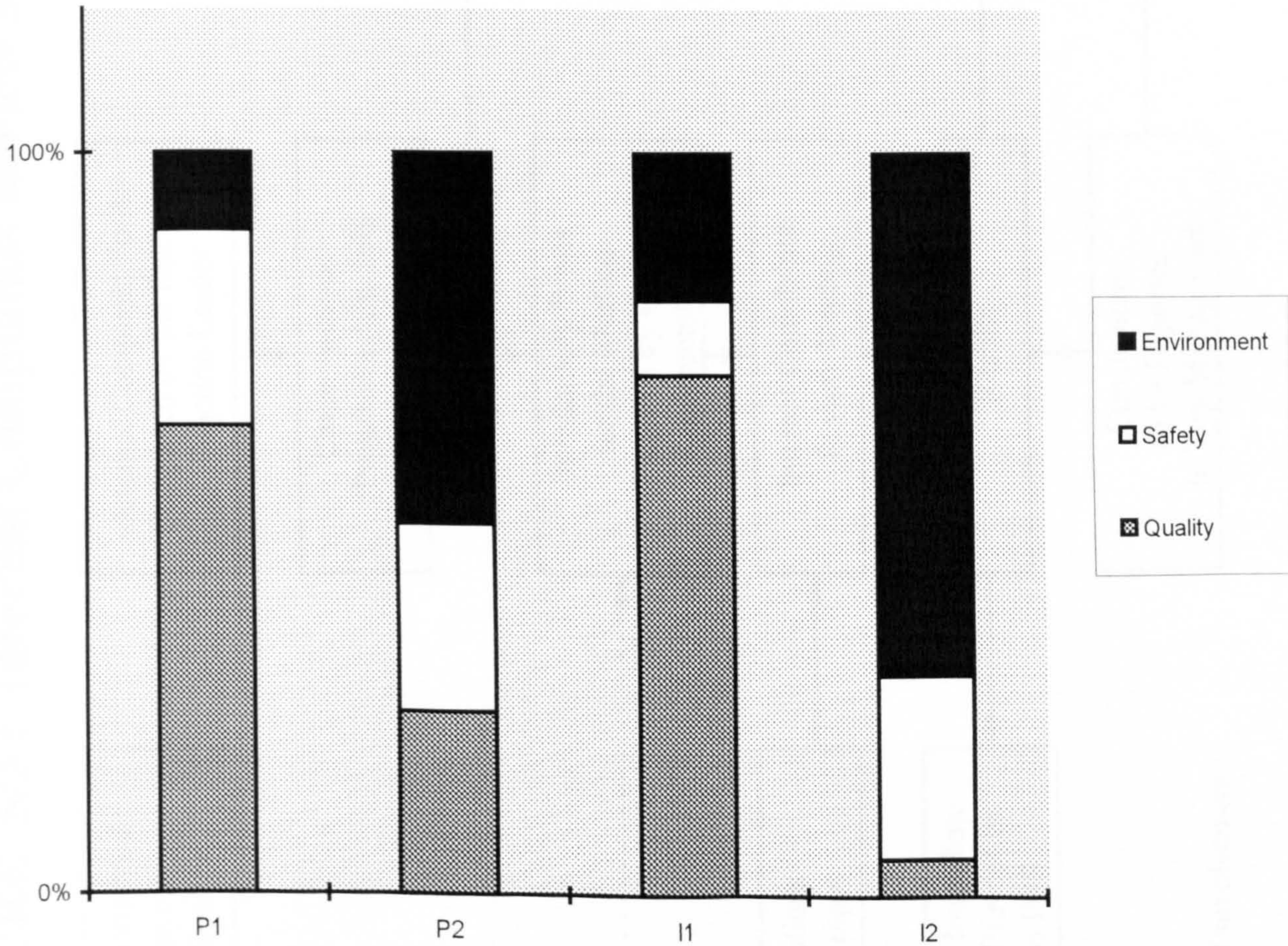


FIGURE 5/3 : Internal Complaints Review System (IC)

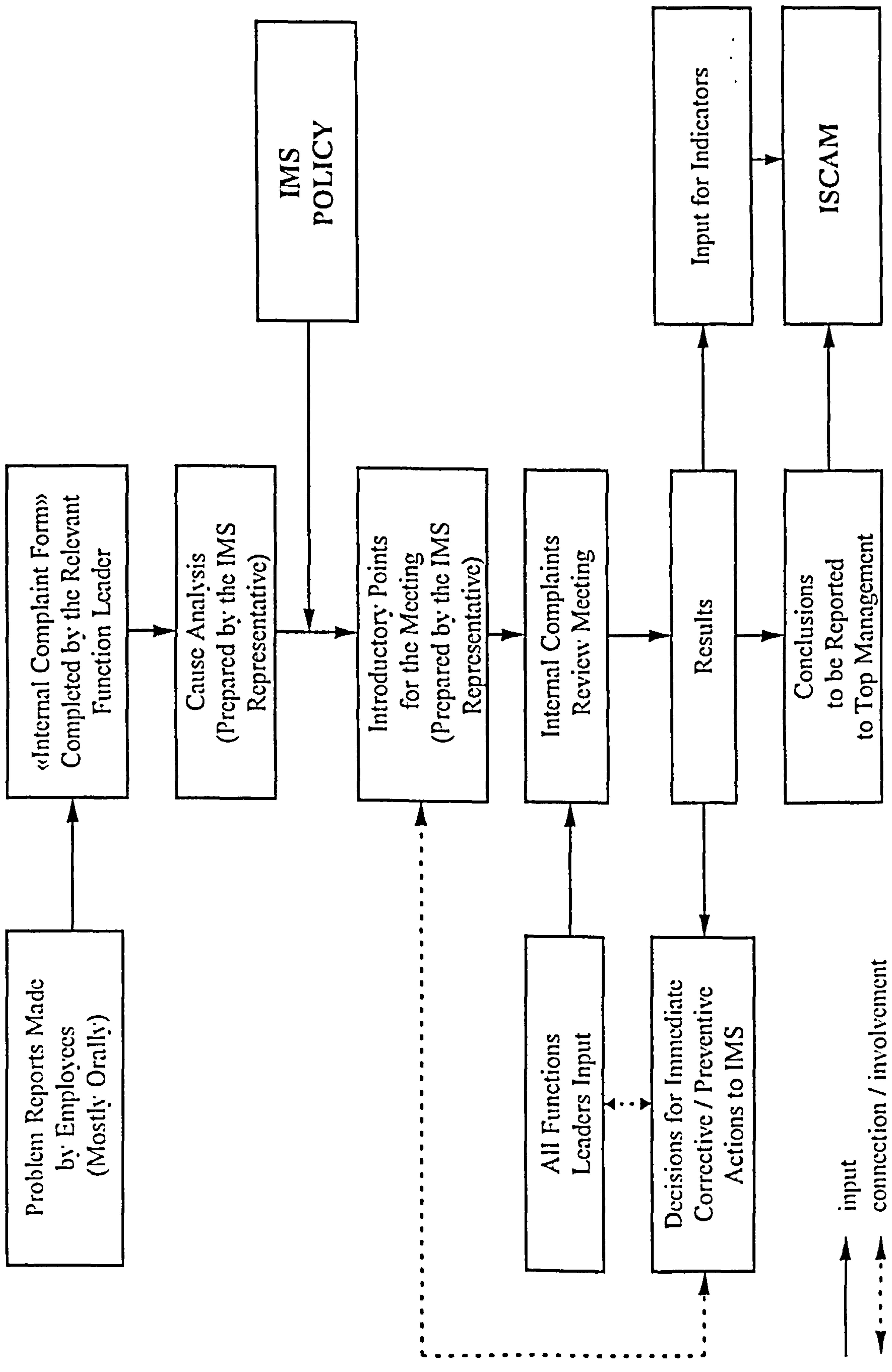


TABLE 1/3 (*)
A Risk Level Estimator

	Slightly harmful	Harmful	Extremely Harmful
Highly unlikely	TRIVIAL RISK	TOLERABLE RISK	MODERATE RISK
Unlikely	TOLERABLE RISK	MODERATE RISK	SUBSTANTIAL RISK
Likely	MODERATE RISK	SUBSTANTIAL RISK	INTOLERABLE RISK

NOTE: Tolerable here means that risk has been reduced to the lowest level that is reasonably practicable.

(*) The Table is extracted from the BS 8800:1996 standard, Annex D (informative): Risk Assessment, where it is presented as **Table D.1: A simple risk level estimator**

CHAPTER 4: BENEFITS FOR SMEs FROM THE IMS ROUTE-MAP IMPLEMENTATION

Chapter 4: Benefits for SMEs from the IMS Route-map Implementation, explains the way that the implementation of the IMS route-map meets the SMEs needs for survival and development as they are outlined in 2.1.6 and the resulted benefits for these organizations.

Additionally, an analysis of the fact that the IMS route-map fits to the special characteristics of SMEs, as they are identified in paragraph 2.1, is presented.

Chapter 4 consists of one (1) paragraph.

The implementation of the IMS route-map that has been fully presented in Chapter 3, addresses the SMEs needs for survival and development and provides practical guidance to these organizations to effectively work on all areas of concern (quality, safety and environmental management) and achieve performance improvement.

The most important benefit of SMEs, that is resulted from the implementation of the IMS route-map relies on the fact that a **management systems approach** is introduced and established to them, in relation to their business mentality and operational framework.

Referring to each one of the SMEs needs for survival and development, as they were outlined in paragraph 2.1.6, the implementation of the IMS route-map can result in the following benefits:

1. From its first step, the IMS route-map provides guidance for the establishment and documentation of a strategic direction to SMEs, tailored to their specific needs and in agreement with the organizational short, medium and long term overall objectives. The IMS route-map includes this process in a common framework with the activities of diagnosis of existing situation, as it has to be directly related to the results of the diagnosis for assuring that it is realistic and efficient.
2. The involvement of top management in the IMS route-map implementation and its commitment to quality, safety and environmental management principles, can be identified in all its steps, beginning from the arrangements described in the second step of the IMS route-map. It must be underlined that the extensive involvement of top management is the second milestone of the IMS route-map. As the role of top management is very critical for the determination of SMEs mentality, the continuous involvement and commitment of the top management to the concepts introduced by the implementation of the IMS route-map, will progressively result to an organizational culture change.
3. The implementation of the ISCAM tool provides the organization with a system of continuous assessment monitoring, that radically helps top management to respond quickly to any circumstances, and gives quantified information of the performance of the organization, in relation to its quality, safety and environmental objectives, for corrective and preventive actions to be immediately undertaken.

Since the ISCAMool has been partially implemented in two (2) SMEs (see Appendix C), specific benefits were resulted to them, in relation to:

- the establishment of a system continuously providing information to top management that appeared to be efficient
- the improvement of information flow mechanisms, considering their cost-effectiveness

- the quality, safety and environmental indicators that enabled the quality director in SME A to undertake corrective actions much more quickly than it happened before.
4. The implementation of the MI tool gives SMEs the opportunity to introduce a full range of designed internal and external marketing activities and achieve improvement of customer satisfaction rate.

The partial implementation of the MI tool to SMEs A and C resulted to specific benefits for each organization (see Appendix C) and, moreover, initiated arrangements for the development of a sufficient marketing function. So it can be predicted that similar results are applied generally.

5. The implementation of the LI tool can improve the overall supply chain management activities of SMEs.

The partial implementation of the LI tool to SME A resulted to considerable improvements in raw material inventory management activities and to a redesigned shipping procedure that was both cost effective and improved in relation to product quality.

6. The third step of the IMS route-map includes arrangements that help SMEs establish or enhance human resources management activities. Special guidance is provided for employee training and for the development of an appraisal system in relation to the IMS targets, to achieve employee motivation.
7. The third step of the IMS route-map also includes arrangements for the determination and documentation of IMS job descriptions for all personnel. Such activity is carried out after an extensive process of clarification of roles, responsibilities and authorities has taken place.

The implementation of the QSE tool contributes to the determination of process owners, having the responsibility of implementing the actions resulted from the planning process included in the overall QSE tool mechanism.

The partial implementation of the QSE tool to SMEs A and C indicated this positive contribution of the tool to the determination of process ownership. However, to ensure the extent of this contribution, the QSE tool should be fully implemented to an organization.

8. By the implementation of IC and ISCAM tools, formality in communication paths and of information flow is provided. This issue is very important because it is closely related to the management system approach that has to be adopted by SMEs.

The partial implementation of IC and ISCAM tools to SMEs A and C resulted to improvement in the areas of communication paths, especially in SME A where the problem of communication informality was very serious.

9. The implementation of IMS route-map, as safety and environmental issues are incorporated to it and the requirements of the relevant standards are met, introduces a management system approach to safety and environmental issues and assures that legal and other obligatory requirements are met and all aspects of losses are controlled.
10. Since the IMS route-map is fully and adequately implemented, certification of the SMEs quality and environmental management systems (which are integrated) according to the relevant standards can more easily achieved.

The way the IMS route-map and its particular tools are designed is compatible with the special characteristics of SMEs, because:

- the involvement of the top management in all steps is assured
- the necessary flexibility is given to organizations in the implementation process
- really practical guidance is provided to SMEs, enabling them to follow it, without getting confused among concepts that their people are not aware of or familiar to
- the organizational weaknesses of SMEs are recognized and addressed to get improved, in comparison to management tools that need an adequate organizational structure to exist for being implemented
- the fact that the SMEs resources are limited has been taken under consideration and the resources necessity for implementation is realistic.

CHAPTER 5: CONCLUSIONS

Chapter 5:Conclusions presents the overall conclusions of the research project and the way that the final output of the research project fulfills its objectives.

Additionally, an evaluation of the research project is attempted, in relation to the final output of it.

Finally, proposals for further research are outlined.

Chapter 5 consists of three (3) paragraphs.

5.1 Overall Conclusions of the Research Project

The aim of the research project was to develop a route-map structured set of guidelines and tools for introducing an integrated management system (including quality, safety and environmental issues) to SMEs.

The fundamental elements of the research project were:

- the special characteristics of SMEs and their needs for survival and development, as they were determined by the literature review and the analysis of the results of the relevant standards
- the quality, safety and environmental management principles and the requirements and / or guidelines of the relevant standards.

The final output of the research project, which is fully presented in Chapter 3, fulfills the objectives of the research project, as they were set in paragraph 0.2.

More specifically:

1. The IMS route-map provides an innovative system to SMEs and enables them to manage quality, safety and environmental issues through a unique framework of activities, arrangements and tools. The system is generic, as it can be applied to SMEs of all the four (4) generic categories of developing activities (hardware, software, processed materials and services).
2. By the implementation of the IMS route-map, SMEs get simultaneously prepared for a successful certification according to the ISO 9001:2000 and ISO 14001:1996 standards, since all the requirements of these standards have been addressed and are included in the conceptual Integrated Basis of Quality, Safety and Environmental Management Standards (see 2.2.5 and figure 5/2).
3. The steps of the IMS route-map and the particular tools that it incorporates, give SMEs the opportunity to progressively develop a flexible process oriented mentality in their organizational structure and therefore to increase their efficiency.
4. The implementation of the IMS route-map in SMEs enable them:
 - to control and reduce the quality, safety and environmental non-conformances and the consequent loss, which results to cost reduction
 - to reduce time needed for operating separate management systems
 - to develop more efficient mechanisms to carry out their operational activities, which result to productivity increase

- to improve their management practices, which result to efficiency increase in the overall organizational performance.
5. The IMS route-map includes a particular tool which provides SMEs with a continuous performance assessment monitoring mechanism in relation to quality, safety and environmental issues and enables:
- the SMEs top management to respond quickly to circumstances and to make decisions
 - SMEs to achieve an overall performance improvement in a continuous basis
6. The quality, safety and environmental management systems integration that is achieved by the implementation of the IMS route-map, results to improved management practices, to more efficient internal operation of SMEs and to increase of the customers and other interested parties satisfaction rate. Therefore, the competitiveness of the SMEs increases.

The implementation of this approach was tested and gave sufficient validation of the concepts, as it is presented in paragraph 5.2.

5.2 Evaluation of the Research Project

The IMS route-map which is the output of the research project was developed, based on the theoretically and practically identified characteristics and needs of the user group (SMEs) and this ensures its applicability.

The virtual evaluation of the research project is based on the fact that a **partial validation** of the particular tools of the IMS route-map has taken place, through their implementation to two (2) SMEs included in the data collection procedure.

The implementation of the particular tools of the IMS route-map to the SMEs showed that:

- The mechanism of the tools is logic and the sequence of the steps is properly designed.
- The expected output comes, in relation to the extent the tool has been developed.
- The tools addressed the real areas of concern of SMEs and this can be seen through the difficulties occurred during the implementation of the tools.
- Specific (and in most cases measurable) benefits for the SMEs were resulted.

Another important issue related to the evaluation of the project is the IMS route-map operates as a management approach that provides specific arrangements for SMEs, in relation to quality, safety and environmental issues, and results to a number of benefits for these organizations, but acts also as a **diagnostic tool** that progressively gives sound data for the areas of the organization that need to be **redesigned and improved**.

5.3 Proposals for Further Research

The operation of the IMS route-map, after the IMS route-map has been adequately tailored and matured in the organization, indicates organizational areas or processes of SMEs, that can be improved. To achieve such improvement, the relevant areas or processes should be examined and a redesign process has to be determined and implemented.

A possible next step of research is **the determination of a redesign process** for those organizational areas or processes that are indicated by the operation of the IMS route-map as fields for improvement.

This further research can be focused on two (2) alternative approaches:

- incorporation of a redesign mechanism in the framework of the IMS route-map
- development of a separate tool to be implemented in a complementary way to the IMS route-map.

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APPENDIX A: INTERVIEW CHECKLISTS

In **Appendix A**, the Interview Checklists used for carrying out the data collection procedure, are presented.

Interview Checklist A was used for collecting data from SMEs.

Interview Checklist B was used for collecting data from quality management consultants / specialists.

Interview Checklist C was used for collecting data from Certification Bodies.

Interview Checklist A

Small and Medium Sized Enterprises (SMEs)

A. GENERIC DATA FOR THE SME'S ORGANIZATION (for all SMEs interviewed)

- A.1. Identify the generic category (or categories) in which the SME carries out its activities.
- A.2. How many different products / services does the SME produce / provide?
- A.3. Which is number of the organization's employees?
- A.4. How many years does the SME exist?
- A.5. Does the SME' organization simulate more to pyramid structure or to cross functional process-oriented structure? Which are the main distinct departments?
- A.6. Does the SME have a marketing / sales department? Does the SME export?
- A.7. Does the SME implement a quality management system?
- A.8. How does the SME deal with technological evolution?
- A.9. Does the SME carry out training programs?

B.1. DATA FOR SME'S QUALITY MANAGEMENT SYSTEM (for SMEs that implement a quality management system, either it is certified or not)

- B.1.1. Is the organization's quality system certified and, if yes, according to which standard of the ISO 9000 series?
- B.1.2. Which is the most important reason that made the top management of the SME decide to implement a quality management system?
- B.1.3.a (if the quality management system of the SME is ISO 9000 certified)**
 - B.1.3.a.1 Which was the most difficult phase of the quality management system design and implementation project?
 - B.1.3.a.2 Which was the longest phase of the quality management system design and implementation project?
 - B.1.3.a.3 Did the SME use an external consultant for the quality management system design and implementation project and / or the preparation for the ISO 9000 certification?
 - B.1.3.a.4 Is the day-to-day maintenance of the quality management system the same after the certification compared to the way it was before it?
 - B.1.3.a.5 How do communication channels work among personnel of different departments in the framework of the quality management system?
 - B.1.3.a.6 Does the quality representative have also other responsibilities? If yes, what are they?

B.1.3.b (if the quality management system of the SME is not ISO 9000 certified)

- B.1.3.b.1 Does the SME intend to be ISO 9000 certified? If not why? If yes, in which phase of the relevant preparation is the organization?
- B.1.3.b.2 How does the SME evaluate the operation of the quality management system up till now?
- B.1.3.b.3 Does the SME use an external consultant for the quality management system design and implementation project?
- B.1.3.b.4 How do communication channels work among employees of different departments in the framework of the quality management system?

**B.2. DATA FOR THE WAY THE SME DEALS WITH QUALITY
(for SMEs that they do not implement a quality management system)**

- B.2.1. Has the SME got an independent Quality Control department? Does the SME implement any activities of quality assurance?
- B.2.2. How does the SME assure its customers for the quality of its products / services (for example, by giving a certificate of conformance etc.) ?
- B.2.3. How does the SME deal with customer complaints?
- B.2.4. Does the SME plan to introduce a quality management system soon?
- B.2.5. How does the SME monitor its performance towards quality issues (for example, by measuring the quantities of non-conforming products, by monitoring customer complaints etc.) ?

**C. DATA FOR THE SME'S SAFETY AND ENVIRONMENTAL
MANAGEMENT ISSUES**

- C.1. Does the SME identify the environmental aspects of its activities, products or services and their impact on the environment, in a systematic way (for example, by using a procedure)?
- C.2. Does the SME maintain documented safety instructions for personnel dealing with any kind of hazardous activities?
- C.3. How does the SME deal with accidents and / or emergency situations? Does the SME monitor the relevant cost?
- C.4. Does the SME implement training programs on safety and environmental issues for the whole personnel?
- C.5. Does the person(s) responsible for health, safety and environmental issues have other responsibilities? If yes, what are they?

Interview Checklist B

Quality Management Consultants / Specialists

1. What difficulties do you usually face during a quality management system design and implementation project in an SME?
2. Which are the main three (3) phases of such a project from a consultant's point of view? When do you think the personnel training must take place?
3. How long does a quality management system design and implementation project take, in relation to size of the organization?
4. Why do SMEs usually want to introduce a quality management system?
5. Which managerial level resists more in the quality management system implementation:
 - top management
 - middle management
 - operational staff
6. Do you usually have delays in your time-schedule for such a project? Which are basically the reasons for such delays?
7. Do the employees of SMEs give you adequate data in the phase of quality management system design?
8. Do the employees of SMEs contribute satisfactorily to the phase of building up the quality management system documentation? How does the organization react in the necessity of documenting things?
9. Do SMEs involve marketing and sales department(s) in the quality management system design and implementation project as much as technical and production departments?
10. Do SMEs employ a new person for the position of the quality representative, or they use an individual from inside the organization?
11. How often do SMEs, ask for consultancy in the area of safety or environmental management?
12. Do you think that the internal cost of a quality management system is high for an SME, even after the phase of preparation for certification? Why? Why not?
13. Do SMEs usually believe in the relationship between the operation of a quality management system according to ISO 9000 standards and the organization's total performance improvement?
14. Any other comments you would like to make...

Interview Checklist C

Certification Bodies

A. RELATIONSHIP BETWEEN THE CERTIFICATION BODY AND SMEs BEFORE THE CERTIFICATION AUDIT

- A.1. How much aware of the quality management system and ISO 9000 standards are SMEs when they first contact the Certification Body?
- A.2. Usually an employee of the SME comes to discuss the whole issue with the Certification Body staff or a consultant of the organization?
- A.3. Is the way that SMEs fill the initial self-assessment questionnaire of the Certification Body satisfactory? Do these self-assessment questionnaires really help the Certification Bodies to their final assessment audit?
- A.4. How often do SMEs «disappear» after the initial contact? How much time usually passes between the initial contact and the certification audit?
- A.5. Do SMEs ask for consultancy and support in the area of quality management and ISO 9000 standards implementation from the Certification Body directly or indirectly?

B. DATA RELATED TO SMEs QUALITY MANAGEMENT SYSTEM ASSESSMENT FOR ISO 9000 CERTIFICATION

- B.1. How often do SMEs ask for a pre-assessment audit? When such audit takes place, in which percentage do the quality management systems of SMEs comply with the ISO 9000 standards requirements?
- B.2. Have any corrective actions taken place between the pre-assessment audit and the final audit, according to the pre-assessment report given to the organization by the Certification Body? Are the corrective actions documented and recorded?
- B.3. Which are the most common weaknesses of SMEs quality management systems? Do these weaknesses reflect organizational weaknesses or inadequate interpretation of ISO 9000 standards requirements?
- B.4. Which is usually the level of SMEs quality management system documentation accuracy, compared to the organization's actual operations?
- B.5. How do SMEs perform in relation to safety and environmental issues?,
- B.6. How often do SMEs combine their quality management system with safety and environmental management activities/ plans / programs?
- B.7. During the first certification audit do SMEs demonstrate measurable indices showing that the quality management system operates effectively and efficiently according to established quality objectives?
- B.8. Which managerial level of SMEs is usually more aware of the concepts of quality management and ISO 9000 standards:
 - top management
 - middle management
 - operational staff

- B.9. Is the quality representative of SMEs an employee or a part time external consultant / expert cooperating with the organization just for the quality management system design and implementation project up till the certification is accomplished ?
- B.10. Which are the most common non-compliances of SMEs quality management systems, according to the requirements of ISO 9000 standards?
- B.11. Are SMEs interested in using the quality management system as a tool for continuous improvement or they just want the certificate?
- B.12. How do SMEs «feel» for Certification Bodies? How do consultants «feel» for Certification Bodies?

C. MAINTENANCE OF THE QUALITY MANAGEMENT SYSTEM IN SMEs

- C.1. In what situation are the quality management systems of SMEs during the annual surveillances, after certification (in term of implementation and compliance to the requirements of ISO 9000 standards):
- same
 - better
 - worse?
- C.2. Do SMEs really communicate with the Certification Body after their quality management systems are certified, or they contact it just for typical purposes?
- C.3. How often do SMEs lose their certificate? Which are the most usual reasons for losing the certificate?
- C.4. Do SMEs tend to use the quality management system as an organizational tool after the system is certified?
- C.5. Are the quality management systems of SMEs found to be more mature, during surveillances after they have been certified or during the re-certification audit when the validity of their certificate finishes?

APPENDIX B: DATA COLLECTION RESULTS SHEETS

Appendix B presents the data collection results sheets for all SMEs, quality consultants / specialists and Certification Bodies included in the data collection procedure.

DATA COLLECTION RESULTS SHEET - SME A

Procedure Details	The thesis author has been a Quality Director in SME A since 1996. During this period of time she redesigned the quality management system that a team of external consultants had previously introduced and led the organization to a third party certification according to the ISO 9002:1994 standard in the summer of 1997. Since then, a pilot integration of safety and environmental management system to the quality management system has started and the IMS route-map tools developed by the research project have been used and partially validated. Information about the organization's characteristics and needs has been continuously collected in a dynamic way, for many things are changing as the quality system gets more mature and the pilot integration proceeds. In addition to all these, a formal interview based on Interview Checklist A took place with the organization's director general, after the quality management system was certified according to the ISO 9002:1994 standard.
A.1.	Processed materials / Production of wires and wire products
A.2.	The organization produces about 300 different products and the processes are usually tailored to the technical requirements of even one specific customer.
A.3.	300 employees / 222 employees are working in the production lines, 35 employees are working in the technical support workshops, 8 employees are working in the quality department, 15 employees are working in the commercial and distribution department, 10 are working in the financial and accounting department, 4 employees are working as administration support, 1 employee is working as personnel manager and 5 individuals constitute the management of the organization. Most of these employees are working in the organization for more than 20 years and they are very experienced.
A.4.	The organization exists for 71 years and it is a typical family organization.
A.5.	The organizational structure is close to pyramid, but the very high level of informality very often negates the structural arrangements. The main distinct departments are: the manufacturing department, the quality department, the technical support department, the commercial department and the financial department. R&D activities do not take place systematically.
A.6	The organization has a commercial department, almost exclusively oriented to sales and shipping procedures. Promotion activities do not take place, due to the fact that the owner (who has the title of «managing director») does not believe that such activities can benefit the organization, as the product is industrial and the market is price-oriented. In addition to that, the organization was a monopoly in the Greek market for about 50 years and this is a very important reason for its weaknesses in marketing activities. A systematic and documented marketing analysis has never been carried out. The first activity for evaluating the customer satisfaction level was a simple questionnaire that was sent to key customers during the period of preparation for the ISO 9002 certification. The organization exports to the European Union and to Middle East countries.
A.7	The organization implements an ISO 9002 certified quality management system.
A.8	The organization's technological level is rather low in production activities. As the organization has been existing for many years, connections with technology providers exist and information about new machinery and equipment reaches the organization very quickly. The way that this information is utilized within

	the organization is not efficient. Actually, the only person who decides for technological issues is the owner. Information technology is used only for trivial applications.
A.9	Training programs are mostly job-oriented and are carried out to cover imminent needs. A systematic training program for quality management and the ISO 9000 standards was carried out throughout the whole organization. Occasionally, European Union initiatives for funding training programs are exploited.
B1.1.	The organization's quality system is certified according to the ISO 9002:1994 standard.
B1.2.	The organization initially decided to introduce a quality system for taking an ISO 9000 certificate to use as a marketing tool. There were also some customers that had started to talk about this certificate. But as soon as the quality system was put in place, the director general was convinced that it could be very useful for organizational improvement and cost reduction.
B1.3.a.1	The most difficult phase of the quality management system design and implementation project was the phase of persuading the directors of the departments to get involved and actively participate to the whole project. In fact it was an expression of their resistance to change. A very difficult point was also to find the appropriate person to design and run this project.
B1.3.a.2	The longest phase of the quality management system design and implementation project was the phase of the documentation development, as the production processes are too complicated and most of the necessary input was locked in the minds of one or two experienced individuals who were very unwilling to help, so information had to be extracted through day to day activities. Another point was that not only was the overall documentation of the organization (mostly the forms used in functions) not integrated, but it was scattered here and there and phenomena of duplication were very common. The director general, for assuring his ability to receive certain information, had asked each department to give directly to him a separate completed form, apart from what people of this department already recorded in other forms.
B1.3.a.3	The organization initially used a team of external consultants but the project could not proceed, as these people, due to their part time type of cooperation, could not fully comprehend the existing mechanisms of the organization and adapt their methodology to the mentality of the organization's people, so they developed a system that was not tailored to the organization and, thus, could not be implemented. For this reason the director general decided to employ an individual to carry out the whole thing from inside.
B1.3.a.4	No significant differences can be seen. Maybe after the certification, the every-day activities for the maintenance of the quality system seem to be more balanced as they are fully incorporated to the overall activities of personnel.
B1.3.a.5	Communication channels among different functions have been impressively facilitated by the implementation of the quality management system, especially because of the fact that written communication has been established and responsibilities have been clarified. As the informal paths of communication were uncontrollable, conflicts and misunderstandings were an every-day situation. Written communication through the forms of the quality management system helped this situation be minimized.
B1.3.a.6	The quality director has the responsibility of the Quality Control department and has also the responsibility of carrying out overall plant inspections, supervising environmental issues and supervising all activities of the commercial department that have to do with customer complaints, recalls and servicing.

C.1.	The organization has identified the major environmental impacts of their activities (mostly related to water pollution and noise pollution) and has taken measurements for reducing or even eliminating them because of legal issues and the fact that it is located in a small town and serious environmental impacts result to problems in the organization's relationships with the local authorities and the community.
C.2.	The only documented safety instructions that exist are these dealing with fire emergency plans, as they are legally required.
C.3	The organization deals «ad hoc» with accidents and emergency situations. The relevant cost is not recorded. The overall view of the organization's owner and director general is that safety needs a lot of financial resources for investments. The systems approach of safety has not been espoused by the top management of the organization. The organization tries just to fulfil its legal requirements. The health and safety committee has not contributed to the relevant issues because is mostly inactivated and focused on issues of syndicalism.
C.4	Not systematically.
C.5	The responsible for health and safety issues is a technician working in the technical support department as a workshop supervisor. The quality director supervises environmental issues.
Additional Data	<ol style="list-style-type: none"> 1. The organization is a typical SME, despite the number of employees, because it is totally focusing the mentality and the centralized management style of the owner. The director general who has a different mentality and management style, as he was not fully supported by the owner, did not influence the mentality of the organization. 2. The owner has never been willing to delegate responsibilities and to give authorities to people. He does not believe in the basic management principle which says that each employee must have only one supervisor. As he needs to have the overall control, he mixes all situations and people and he appears to be the one who gives solutions. 3. The quality management system was finally implemented and certified according to the ISO 9002:1994 standard because the director general was committed to that and fully supported the activities of the quality director during the whole project, by giving her the authority and resources needed to carry out her responsibilities. The owner also wanted the ISO 9002 certificate as a marketing tool, so he also supported the whole effort. <p>Note: Some additional data relative to SME A is also reported in Chapter 2, paragraphs 2.1, 2.3 and also in Appendix C, where the partial validation of the IMS route-map tools applicability is presented.</p>

DATA COLLECTION RESULTS SHEET - SME B

Procedure Details	The thesis author had a six-month cooperation with this organization for the preparation of a feasibility study that accompanied a proposal for an investment funding, in the beginning of 1996. During this period of time she had the opportunity to examine the organizational structure and the management style of the SME. She had a direct cooperation with the manager/owner of the organization. A formal interview based on Interview Checklist A took place with the organization's manager/owner about a year after that cooperation had finished.
A.1.	Processed materials / Production of woven and stamped labels for cloths
A.2.	The organization produces two different kinds of labels: woven and stamped.
A.3.	28 employees / 14 employees are working in the production line, 6 employees are working in the packing process, 1 employee is working as a designer, 2 employees are carrying out the financial and accounting activities, 1 employee is working as a shop-floor engineer, 1 employee is carrying out the order-taking activities, 1 employee is carrying out the exports shipping activities and 2 employees are carrying out the distribution activities.
A.4.	The organization exists for 50 years and it is a family SME that is now managed by only one member of the second generation of the family. His mother, who used to run the whole organization in the past, visits the company and tells her opinion whenever has the opportunity to do so. His brother in law is also involved in the distribution activities.
A.5.	A process orientation can be identified in the organizational structure, rather than a pyramid. Distinct departments do not exist and the control of all activities is centralized to the manager/owner of the organization. Product design activities take place.
A.6	No marketing department exists and sales are organized and promoted by the manager/owner. He has a direct communication with commercial agents all around the world, as the organization has a strong export orientation. The organization participates in local and international exhibitions, where promotion activities take place.
A.7	The organization does not implement a quality management system.
A.8	The technological level of the organization is very satisfactory, mostly because the manager/owner is interested in technology evolution and he personally tries to be well informed about the state of the art in the area of the organization's activities. He believes in investing in high technology and he does so. CIM systems are used and the production machinery is very modern.
A.9	Training programs are provided only when a new machinery arrives at the plant and some people working in the production line must be trained. In these cases training is provided by the supplier house. The manager/owner personally attends many training programs that he finds them interesting.
B2.1.	The organization does not have a quality department. The packing staff carry out an optical inspection of the final product. Product codes related to the design codes and serial numbers of deliveries are put on boxes. No quality control activities of the incoming products take place, only the manager/owner inspect the most important ones and he is informed about any observations made by the production staff.
B2.2.	No certificates of conformance are provided. The customer's assurance is the reliability of the product.
B2.3	The manager/owner personally contact customers that express a complaint and

	a solution is found. These contacts aim exclusively at satisfying the customer. Relevant records are not kept.
B2.4	The manager/owner planned to introduce a quality system according to ISO 9000 standards because he believed that it would benefit the organization externally, as a marketing tool (through the ISO 9000 certificate) and internally, a tool for organizing activities. It is interesting to note that his mother totally rejected this idea, believing that the level of their products' quality is proved by the fact that they sell all around the world, so they do not need any kind of certificate.
B2.5	At the end of every shift, the packing staff leave an informal piece of paper in the office of the manager/owner, reporting how many non-conforming labels were found during their shift, as they inspect them while packing. This is the only activity of monitoring the organization's performance towards quality issues, but records are not kept.
C.1.	The organization has not identified the environmental impacts in a systematic way. Actually the only significant environmental impact is the noise pollution, but the plant is located in an isolated place and relevant problems never occur.
C.2.	No documented safety procedures exist. The organization just provides earplugs for the employees working in the production line, because of the heavy noise.
C.3	Systematic activities do not take place. The organization deals «ad hoc» with accidents and emergency situations. The relevant cost is not recorded. The manager/owner believes that it is a time loss to get involved in safety issues, as serious accidents have never occur since the organization was founded. He only tries to comply to the legal requirements.
C.4	Safety training programs are not carried out.
C.5	The shop-floor engineer has the responsibility for safety.
Additional Data	<ol style="list-style-type: none"> 1. The organization is an SME totally controlled by the manager/owner. This person realizes that an organizational structure has to be introduced, but at the same time he enjoys controlling everything by himself. He gives a priority to the technological upgrading of the design and production activities, instead of the organizational issues, but he is convinced that he has to deal with them soon. 2. The number of employees is very low and informality does not create communication problems - on the contrary, facilitates the processes. 3. The manager/owner's creative personality is reflected throughout the whole organization. People feel free to express their ideas and the atmosphere seems to be pleasant. 4. The organization is customer focused because the manager/owner insists on that point continuously.

DATA COLLECTION RESULTS SHEET - SME C

Procedure Details	A formal interview based on Interview Checklist A took place with the one of the organization's owners. An additional meeting took place after five months with the general manager, for clarifying some details in reference to the data collection and also to the pilot implementation of the IMS route-map tools that the owner had agreed to take place (see Appendix 4).
A.1.	Services / Providing medical beauty and fitness services
A.2.	There is a number of services provided, within two major categories: face beauty treatments and body fitness treatments. Services are usually tailored to the customer needs.
A.3.	131 employees in 6 studios all around Greece / 80 employees are beauticians and dietitians, 10 employees are doctors, 20 employees are working in the marketing and sales activities, 6 employees are carrying out financial and administration activities, 6 employees are carrying out reception activities, 6 employees are carrying out cleaning and housekeeping activities and three individuals constitute the management of the organization.
A.4.	The organization exists for 10 years and it is an SME that was founded by two copartners, one doctor (professor of dermatology) and one businessman.
A.5.	A process orientation can be identified in the organizational structure, rather than a pyramid. Distinct departments do not exist. Only distinct functions can be identified in every studio and there are some differences in the way that these functions operate among different studios.
A.6	An overall organized marketing department does not exist and sales are carried out independently in each studio. As the general manager has a sales orientation, she directly supports the sales employees but no systems mechanism exist. The promotion activities are limited compared with those of competitors.
A.7	The organization does not implement a quality management system.
A.8	The technological level of the organization is very satisfactory because the owners are continuously upgrading the equipment and the products that are used in all treatments. Know-how is provided by a famous Swiss beauty clinic.
A.9	Training programs are provided mostly to beauticians by experts, when new treatments, techniques and equipment are introduced.
B2.1.	The organization does not have a quality department. Optical quality control activities of some incoming products take place by certain beauticians.
B2.2.	No assurance is provided about the results of the services / Only medical support is provided, because customers' medical history is monitored and they are medically observed during their whole presence at the studios.
B2.3	The general manager personally contact customers that express serious complaints and a solution is found. More trivial complains are handled by the treatments supervisors. Relevant records are not kept.
B2.4	The owners are not fully informed about quality systems and ISO 9000 standards, so the introduction of such a system is not going to happen soon. None of the competitors has an ISO 9000 certificate yet.
B2.5	No monitoring about quality performance takes place.
C.1.	Apart from waste disposal, the organization's activities do not have other environmental impacts.
C.2.	No documented safety procedures exist. The manuals of the equipment used include some safety instructions. The organization examines whether the

	products that the beauticians use in treatments could cause irritations of allergies to them.
C.3	Systematic activities do not take place. The organization deals «ad hoc» with such problems. Emergency situations have never existed, but there are possibilities to exist (due to the electricity used in the equipment). The relevant cost is not recorded.
C.4	Safety training programs are not carried out.
C.5	The one of the two owners (the doctor) has the responsibility for health and safety.
Additional Data	<ol style="list-style-type: none"> 1. The organization is a developing SME in a very competitive market. The owners have started to think about quality matters, but as other competitors have not started to do anything in that area, they think that they can wait. The owners have a sufficient knowledge of the content of their business. 2. The general manager influences very much the whole climate of the organization in a positive but not systematic way, as no management system exists to act as a framework. 3. A basic problem outlined by both the owner and general manager is the fact that it is very difficult to find competent personnel to undertake management and sales responsibilities in the studios. 4. Another problem that it was also outlined by both the owner and the general manager is that the organization has not achieved to carry out the services in the same way in all studios and this has also been observed by customers.

DATA COLLECTION RESULTS SHEET - SME D

Procedure Details	The thesis author was an employee of that SME for four months in 1996. She worked in the marketing department as a quality management specialist in activities related to identification of customer needs. During that period of time the organization was introducing a quality management system for being certified according to the ISO 9001:1994 standard and she participated in all the meetings with the quality representative and also was involved in the documentation preparation procedure. A formal interview based on Interview Checklist A took place with the organization's general manager, about a year after the thesis author's cooperation with that SME. The quality system was not yet ISO 9001 certified.
A.1.	Software and services / Development of software and providing training services.
A.2.	The organization has two distinct activities: development of software applications tailored to customer requirements and providing training services for the behalf of a big international telecommunications organization. Training services are not designed by the SME D.
A.3.	50 employees / 16 employees are working in the software development department, 15 employees are working in the training services department, 5 employees are working in the financial and accounting department, 5 employees are working in marketing department, 5 employees are working in the administration and personnel department and 4 individuals constitute the management of the organization. The level of expertise of employees is, in general terms, high.
A.4.	The organization exists for 4 years and it is a subsidiary of a big telecommunications organization, having independence in management.
A.5.	The organizational structure is process oriented. The main distinct departments are: the software development department, the training services department, the marketing department, the financial and accounting department and the administration and personnel department.
A.6	The organization has a marketing department. Marketing planning activities are carried out and also promotion activities. The organizations tries to develop more generic software applications that would meet many customers requirements for improving cost-effectiveness and not always tailoring the product to exclusive requirements. To achieve this, a very detailed analysis of potential customer needs has to take place. The organization sells software packages only to Greek customers at the moment and intends to extend these activities outside Greece. It provides training services all around the world, based on contracts between the parent organization and a big international telecommunication organization.
A.7	The organization implements a quality management system according to the ISO 9001:1994 standard.
A.8	The technology evolution is a core parameter for the organization's activities. The technological level of the hardware infrastructure and systems is high.
A.9	Training programs are provided by the parent organization. The ISO 9000 training was not carried out systematically. Only the managers attended a workshop and they were asked to transfer the concepts to their people, but this did not happen successfully, as the managers themselves had not fully realized the whole thing to be able to transfer concepts to others.
B1.1.	The organization's quality management system is not certified according to the

DATA COLLECTION RESULTS SHEET - SME E

Procedure Details	A formal interview based on Interview Checklist A took place with the plant director of the organization.
A.1.	Processed Materials / Production of fire resistant bricks.
A.2.	The organization produces fire resistant bricks of many different compositions and dimensions but the production process is specific and the parameter that actually changes is that of the composition of powder (raw material) mixture.
A.3.	100 employees / 65 employees are working in the production department, 4 employees are working in the technical department, 2 employees are working in the purchasing department, 7 employees are working in the financial and accounting department, 15 employees are working in marketing and sales department and also carry out distribution activities, 5 employees are working in the administration and personnel department and 3 individuals constitute the management of the organization.
A.4.	The organization exists for 22 years and it is a subsidiary of a big organization, having independence in management.
A.5.	The organizational structure is pyramid. The main distinct departments are: the production department, the technical department, the purchasing department, the marketing, sales and distribution department, the financial and accounting department and the administration and personnel department.
A.6	The organization has a marketing department. Marketing planning activities are carried out mostly by the parent organization. The organizations exports to many countries in Europe.
A.7	The organization implements a quality management system according to the ISO 9001:1994 standard.
A.8	The technological level of the organization is satisfactory. Information technology is widely used for communication purposes. Most of the production processes are automated.
A.9	Training programs are provided by the parent organization. The ISO 9000 training has not been carried out yet.
B1.1.	The organization's quality management system is not certified according to the ISO 9001:1994 standard yet.
B1.2.	The organization decided to introduce a quality system for taking an ISO 9000 certificate because the parent organization required so.
B1.3.b.1	The organization intends to be certified according to the ISO 9001:1994 standard. When the interview took place, the quality management system implementation project was in the phase of building up the documentation. The plant director believed that the organization would not be able to face an ISO 9000 certification audit earlier than 18 months.
B1.3.b.2	The plant director had not identified the benefits of the quality management system implementation. He thought that the quality management system is a customer-focused system and its implementation sometimes ignores parameters like productivity, flexibility and quick response necessity. He referred to the fact that very often he has to solve serious problems immediately, by making decisions that cannot wait for the statistics of the quality management system and he has to be based on informal communication and information channels.
B1.3.b.3	The organization hired a quality specialist for carrying out the project and also being the quality representative in a permanent basis.
B1.3.b.4	The communication channels among different functions have not been impressively facilitated by the quality management system for the time being

	but, in some cases it there has been a slightly positive influence.
C.1.	The organization's activities environmental impacts are minimized because the organization has the proper infrastructure, but no management system has been put in place. The quality representative has also a responsibility for the environmental issues in general.
C.2.	The organization does not have documented procedures for safety issues, but measurements have been taken for personnel protection in the production line. Health and safety committee is activated up to an extent and many investments related to safety issues that have been made, were indicated by this committee.
C.3	The organization deals «ad hoc» with accidents. The relevant cost is not monitored. An emergency plan related to fire is established and once per year, a trial implementation of this plan takes place.
C.4	Safety training is carried out to the new-hired employees that will work in the production line.
C.5	The responsibility for safety is delegated to the technical manager.
Additional Data	<ol style="list-style-type: none"> 1. The organization is an SME slightly influenced by the fact that a big organization is behind it. The climate between the SME and the parent organization is impersonal. 2. The top management of the organization do not seem to be committed to the quality management concepts for the time being. They are primarily focused on a technical approach and not management approach of quality and productivity issues. 3. The quality representative has the competence for carrying out his duties but he has a personality that cannot persuade other people to join the whole attempt, as the plant director said.

DATA COLLECTION RESULTS SHEET - SME F

Procedure Details	The thesis author cooperated with that SME as a quality management system internal auditor. She had the opportunity to examine the quality management system of the organization, the relevant documentation and the way that personnel was involved in that. A formal interview based on Interview Checklist A took place with the organization's manager / owner.
A.1.	Processed materials / Design and production of electrical material.
A.2.	The organization designs and produces many types of switches, plugs and other electrical material and the core production process are the production of plastic covers and the assembling of different parts for constructing the final products.
A.3.	40 employees / 20 employees are carrying out production activities, 3 employees are carrying out activities related to quality, 2 employees are working as salesmen, 3 employees are carrying out distribution activities, 5 employees are working in the financial and accounting department, 1 employee is carrying out purchasing activities, 2 employees are carrying out administration activities and 4 individuals constitute the management of the organization. The level of expertise of employees is average.
A.4.	The organization exists for 20 years and it is an SME managed by the individual who founded it. During the last two years he tries to involve his son in the business activities, by delegating to him the sales and purchasing supervising.
A.5.	The organizational structure is process oriented. The main functions are: production lines, sales and distribution, quality, purchasing, financial and accounting.
A.6	The organization has not got a marketing department. A low number of salesmen visit customers and collect orders. The organization exports to a number of European countries and the manager / owner is carrying out all the relevant contacts.
A.7	The organization implements a quality management system according to the ISO 9001:1994 standard.
A.8	The technological level of the production machines is satisfactory. A number of almost fully automated machines are installed and the quality control laboratory has all equipment and facilities needed for testing products.
A.9	Training programs are occasionally provided by the organization. ISO 9000 training was not carried out.
B1.1.	The organization's quality management system is not certified according to the ISO 9001:1994 standard yet.
B1.2.	The manager / owner decided to introduce a quality system for taking an ISO 9000 certificate because he thought that the whole situation could help the organization both externally and internally.
B1.3.b.1	The organization intends to be certified according to the ISO 9001:1994 standard. When the interview took place, the quality management system implementation project was in the phase of implementing the whole documentation and creating the quality records. The internal audit took place for assessing the performance of the quality management system and its compliance to the ISO 9001:1994 standard requirements. It was found that the quality management system documentation was not fully tailored to the organization needs and that the management responsibilities relevant to the standard were not fully understood by the manager / owner. Some other

	secondary non-compliances were also found, related to the product identification and traceability and to the documentation and data control. Personnel awareness was not satisfactory.
B1.3.b.2	The manager / owner has identified the benefits of the quality management system implementation. He generally believes that if the system is fully implemented, the organization will be benefited in all fields: organizational structure, cost-effectiveness, increase of market share. He has already seen that the ISO 9001:1994 standard requirements have led to reduction of non-conforming products, less customer complains and better control of people's work.
B1.3.b.3	The organization used an external consultant for the project. The manager / owner hired an employee to be the quality representative.
B1.3.b.4	The communication channels among different functions have been facilitated by the quality management system, because informality resulted to misunderstandings, conflicts and inadequate control of information exchange.
C.1.	The organization's activities are not considered to have environmental impacts. Plastic material is recycled.
C.2.	Hazardous activities have not been identified. No documented procedures for safety exist.
C.3	Accidents and emergency situations are handled «ad hoc». The relevant cost is not monitored.
C.4	Safety training programs are not carried out.
C.5	No responsibility for safety is delegated.
Additional Data	<ol style="list-style-type: none"> 1. The organization is an SME influenced by the management style of the owner who is a rather open-minded person and is willing to change things if he is convinced for their necessity. The climate within the organization is positive. 2. The quality consultant did not tailor the quality management system to the special characteristics of the organization. 3. The manager /owner had not fully realized the significance of his role as the company leader for the success of the quality management system. As soon as he was aware of that he was very willing to get involved in all activities and to demonstrate his commitment to the whole personnel.

DATA COLLECTION RESULTS SHEET - SME G

Procedure Details	The thesis author had a four-month cooperation with this organization for the preparation of a feasibility study that accompanied a proposal for an investment funding in the spring of 1996. During this period of time she had the opportunity to examine the organizational structure and the management style of the SME. She had a direct cooperation with the managers / owners of the organization. A formal interview based on Interview Checklist A took place with one of the organization's managers/owners about nine months after that cooperation had finished.
A.1.	Processed materials / Production of marble and granite parts and items.
A.2.	The organization produces many types and sizes of marble and granite parts and items and the production processes are specific and common for all products. Alterations may take place due to the technical performance of the raw material.
A.3.	20 employees / 11 employees are working in the production line, 2 employees are carrying out technical support activities, 2 employees are carrying out sales and distribution activities, 2 employees are carrying out the financial and accounting activities, 1 employee is carrying out administration activities and 2 individuals constitute the management of the organization.
A.4.	The organization exists for 20 years and it is a family SME that is still managed by the two brothers who founded it.
A.5.	A process oriented organizational structure is identified. The two brother share all management activities: one manages all production and technical issues and the other deals with sales and financial issues.
A.6	A marketing and sales department does not exist. One of the two owners (helped by a salesman) carries out all the activities related to sales and communicates directly with customers. The organization intends to start exporting.
A.7	The organization does not implement a quality management system, only quality control activities take place in the production line and by the same people that carry out the production activities.
A.8	The technological level of the organization is satisfactory and the managers / owners plan to introduce new technology very soon.
A.9	Training programs are not provided generally, only on-the-job training to new-hired people by their experienced colleagues.
B2.1.	The organization has not got an independent quality control department. Quality control activities, basically related to the dimensions of the parts / items, are carried out by people of the production lines. Non-systematic quality control activities are carried out in the in-coming products in a cooperation with external laboratories and these arrangements are managed by the manager / owner having the responsibility for production and technical matters.
B2.2.	No certificates of conformance are provided.
B2.3	No procedure for customer complaints handling exists. The managers / owners directly contact the customer that has expressed the complaint and try to solve the problem. They examine the causes of the complaint and decide for any corrective actions needed. No records are kept.
B2.4	The managers/owners plan to introduce a quality system according to ISO 9000 because they believed that it would benefit the organization externally, as a marketing tool (through the ISO 9000 certificate) and they will be helped in

	their exporting attempts.
B2.5	No systematic activities are carried out for monitoring the organization's performance towards quality issues.
C.1.	The organization has generally identified the major environmental impacts of their activities. The most important have to do with the marble dust and the liquid chemicals used in cutting processes. For these liquid chemicals, the organization uses a modern installation for recycling waste water, so this impact is almost eliminated. The problem of dust remains, but due to the fact that the plant is installed in an isolated place, it does not affect people directly.
C.2.	No documented safety procedures exist. Jack equipment are systematically maintained, for avoiding accidents. Some simple technical measurements have been taken for employees protection.
C.3	The organization deals «ad hoc» with accidents and emergency situations. The relevant cost is not recorded.
C.4	Safety training programs are not carried out.
C.5	Responsibility for safety has not been delegated.
Additional Data	<ol style="list-style-type: none"> 1. The managers/owners are open-minded people. They share the management activities in a balanced and efficient way. An atmosphere of good communication can be identified throughout the whole organization. 2. Most of the employees in the production line are very experienced. Employees dealing with all other activities in the offices are low-qualified.

DATA COLLECTION RESULTS SHEET - SME H

Procedure Details	The thesis author had a four-month cooperation with this organization as a member of a quality consultants group in the beginning of 1996. During this period of time she had the opportunity to examine the organizational structure of the SME, in the framework of the diagnostic analysis phase. A formal interview based on Interview Checklist A took place with the organization's manager /owner about a year after that cooperation had finished.
A.1.	Processed materials / Production of plastic bottles and vessels.
A.2.	The organization produces many types and sizes of plastic bottles and vessels and the production processes are specific and common for all products.
A.3.	20 employees / 12 employees are working in the production line, 2 employees are carrying out technical support activities, 3 employees are carrying out sales and distribution activities, 1 employee is carrying out the financial and accounting activities, 1 employee is carrying out administration activities and 1 individual constitutes the management of the organization.
A.4.	The organization exists for 12 years and it is managed by the man who founded it.
A.5.	A flat organizational structure is identified. The manger / owner controls everything and decides for everything.
A.6	A marketing and sales department does not exist. The manager / owner carries out all the activities related to sales and communicates directly with customers. The organization does not export.
A.7	The organization does not implement a quality management system.
A.8	The technological level of the organization is sufficient for the production processes that take place.
A.9	Training programs are not provided, only on-the-job training to new-hired people by the manager / owner who knows the technical details of the processes very deeply.
B2.1.	The organization has not got an independent quality control department. Process control activities, basically related to the ingredients of the plastic mixture and to the operational parameters of the machines are carried out by people of the production lines and the manager / owner.
B2.2.	No certificates of conformance are provided.
B2.3	No procedure for customer complaints handling exists. The manager / owner directly contact the customer that has expressed the complaint and try to solve the problem.
B2.4	The manager /owner decided to introduce a quality system according to the ISO 9002:1994 standard because he wanted to expand his sales to the area of big multinational lubricant organizations that required from their suppliers to have an ISO 9000 certificate.
B2.5	No systematic activities are carried out for monitoring the organization's performance towards quality issues.
C.1.	The organization has not identified the environmental impacts of their activities in a systematic way. These impacts are not considered to be significant. The plastic material is recycled so plastic material is not deposited to the environment.
C.2.	No documented safety procedures exist. No specific technical measurements have been taken for the health and safety protection of people working at the

	production line.
C.3	The organization deals «ad hoc» with accidents and emergency situations. The relevant cost is not recorded.
C.4	Safety training programs are not carried out.
C.5	Responsibility for safety has not been delegated.
Additional Data	<ol style="list-style-type: none"> 1. The manager /owner used to work in a similar plant and he decided to develop his own business. An organizational structure hardly exists. 2. Most of people are not sufficiently competent for carrying out their work in an effective and efficient way. 3. For this SME, the ISO 9000 certificate is a matter of survival, as the manager / owner admitted, because the organization needs to be based on big customers. 4. During the period that the thesis author had a cooperation with the organization, the manager / owner had not actually made up his mind about the things he had to do for being ISO 9000 certified. During the formal interview, though the manager / owner had stopped the cooperation with the team of consultants, some of his ideas were more mature, e.g. he decided to hire a quality manager, to start implementing systematic quality control activities for the dimension and the shape of the casts and to buy the relevant equipment. It must be noted that this SME totally lacked of people with adequate competence to proceed projects like the implementation of a quality management system.

DATA COLLECTION RESULTS SHEET - SME I

Procedure Details	The thesis author had a five-month cooperation with this organization for the preparation of a feasibility study that accompanied a proposal for an investment funding in the spring of 1996. During this period of time she had the opportunity to examine the organizational structure and the management style of the SME. She had a direct cooperation with the quality control manager and the manager / owner of the organization. A formal interview based on Interview Checklist A took place with the organization's manager/owner about ten months after that cooperation had finished.
A.1.	Processed materials / Production of cosmetics
A.2.	The organization produces about 30 different products based on six main production processes.
A.3.	73 employees / 35 employees are working in the production lines and packing, 22 employees are working in the marketing and sales department, 4 employees are working in the quality control laboratory, 8 employees are carrying out the financial and accounting activities and 4 individuals constitute the management of the organization.
A.4.	The organization exists for 40 years and it is a family SME that is still managed by the person who founded it. His children are not involved in the organization.
A.5.	A pyramid organizational structure is identified and a centralized management style is adopted by the manager / owner. Managers have limited authorities.
A.6	A marketing and sales department exists but no promotion activities actually take place. A big number of salesmen contact a limited number of customers (mostly suppliers of hairdressers and beauty shops).The organization used to export in the past.
A.7	The organization does not implement a quality management system, only quality control activities.
A.8	The technological level of the organization is very low. The production methods are old-fashioned and the products' technical characteristics and properties are very poor in comparison to those of competitors. The manager / owner explained that the organization could not afford to introduce machinery and methods of higher technological level without external funding and, additionally, could not afford to hire high qualified people.
A.9	Training programs are provided only when there is a funding for them and are mainly focused in the area of sales.
B2.1	The organization has got a quality control department, because the relevant legal requirements are very strict and quality control must be carried out in the in-coming products, in-process products and final products. Many biological tests must also be carried out. Some quality assurance activities also take place (product identification and traceability, determination of quality status) but no documentation exist, except from some records of test reports, legally required.
B2.2	No certificates of conformance are provided.
B2.3	No procedure for customer complaints handling exists. Salesmen are the people who hear the complaints and the only thing that they do is to inform the manager / owner who will finally decide for a discount to the customer who expressed the complaint.
B2.4	The manager/owner planned to introduce a quality management system according to ISO 9000 standards because he believed that it would benefit the organization externally, as a marketing tool (through the ISO 9000 certificate),

	but not in the foreseeable future.
B2.5	Records are kept for batch productions that have been rejected and also for incoming products that have been rejected. No systematic activities are carried out for monitoring the organization's performance towards quality issues.
C.1.	The organization has not identified the environmental impacts in a systematic way. The environmental impact of the thin water solutions that are used in some production processes and leave the plant without being neutralized is not managed or technically faced.
C.2.	No documented safety procedures exist. Only rules for the product hygiene are issued.
C.3	The organization deals «ad hoc» with accidents and emergency situations. The relevant cost is not recorded. The health and safety committee exists only in papers.
C.4	Safety training programs are not carried out.
C.5	The production supervisor has the responsibility for safety.
Additional Data	<ol style="list-style-type: none"> 1. The manager/owner tries to totally control the organization. His old-fashioned business mentality which is based on the principles of thrift and of «making employees feel fear for the boss» is reflected throughout the whole organization. Initiatives are not enhanced and sometimes they lead to punishment. 2. The manager/owner uses very inefficient methods of sales and he does not use any promotion methods to increase his market share. Even the packing of the products is not at all attractive. 3. Most of the organization's employees are low qualified.

DATA COLLECTION RESULTS SHEET - SME J

Procedure Details	The thesis author has been a member of a quality consultants team that designed and introduced a quality management system according to the ISO 9002:1994 standard to SME J and also supported the company until it was certified in the summer of 1996. The whole cooperation lasted for one year. During this period of time she participated in all the meetings with the management team of SME J, she was involved in the documentation preparation procedure and she also participated in the internal audit that was carried out two months before the certification audit. A formal interview based on Interview Checklist A took place with the organization's quality manager, about a year after the quality management system was certified according to the ISO 9002:1994 standard.
A.1.	Services / Gas distribution services
A.2.	The organization provides gas distribution services.
A.3.	70 employees / 29 employees are involved directly in the distribution activities, 12 employees are working in the engineering department, 7 employees are working in the financial and accounting department 7 employees are working in marketing and sales department, 5 employees working in the service department, 5 employees are working in the administration and personnel department and 5 individuals constitute the management of the organization (including the quality and safety manager)
A.4.	The organization exists for 35 years and it is a subsidiary of a big organization, having independence in management.
A.5.	The organizational structure is close to pyramid. The main distinct departments are: the distribution department, the engineering department, the marketing and sales department, the service department, the financial and accounting department and the administration and personnel department.
A.6	The organization has a marketing and sales department. Promotion activities are mostly designed by the parent organization, combined with the service activities. No systematic marketing analysis is carried out. The first activity for evaluating the customer satisfaction level was a simple questionnaire that was sent to customers during the period of preparation for the ISO 9002 certification. The organization provides distribution services only within Greece.
A.7	The organization implements a quality management system certified according to the ISO 9002:1994 standard.
A.8	The technology evolution is not a core parameter for the organization's activities, except from the safety issues. Modern equipment and procedures are provided by the parent organization. Information technology is used for rather trivial applications internally and for communication with the parent organization.
A.9	Training programs are provided by the parent organization and are mostly oriented to personnel development and safety issues. The ISO 9000 training was carried out through two workshops: one for the employees dealing with operational activities and one for the employees of supporting and administrative activities and the management team.
B1.1.	The organization's quality system is certified according to the ISO 9002:1994 standard.
B1.2.	The organization decided to introduce a quality system for taking an ISO 9000

	certificate to use as a marketing tool. The parent organization put an extra pressure for that.
B1.3.a.1	The most difficult phase of the quality management system design and implementation project was the phase of persuading the managers and supervisors to get involved and actively participate to the whole project. In fact it was an expression of their resistance to the change of the way they used to work. The quality manager, due to the fact that he was also safety manager and he already worked hard, initially resisted to the general manager's decision about taking also the responsibility for quality. As the project proceeded, he felt better with that.
B1.3.a.2	The longest phase of the quality management system design and implementation project was the phase of implementation of the quality management system forms relevant to procedures, as employees were rather unwilling to realize the new record keeping mechanism. According to the quality manager's opinion, the problem occurred due to the fact that too many forms changed and this was interpreted by the employees as a change to the work itself. If more of the previous forms had been maintained, even with some alterations, the progress of the whole situation would have been quicker.
B1.3.a.3	The organization used a team of external quality consultants that led them to certification.
B1.3.a.4	After the certification, some things were modified in a simpler way and the maintenance of the quality management system was fully incorporated to the overall activities of personnel. But still there are some gaps between activities that take place for carrying out a certain process and activities that are considered to be totally related to the quality management system, e.g. two different forms are completed while order taking: one to be given to the distribution department and another one to be kept in the quality system record. The level of the integration of the quality management system within the organization can be further more improved.
B1.3.a.5	Communication channels among different functions have not been significantly influenced by the implementation of the quality management system. Only in a few cases some bureaucracy has been added that make things a little bit slower.
B1.3.a.6	The quality manager has also the responsibility of safety issues which are very critical in this organization, as the handling of the material is hazardous in all phases of the process.
C.1.	The organization has identified the major environmental impacts of their activities, which are mostly related to a possible accident occurrence. Systematic measurements for reducing or even eliminating them have been taken (emergency plans, procedures) and also technical arrangement have been made. The organization is located in an industrial zone, so some facilities are provided by the infrastructure of the place.
C.2.	Very detailed documented safety instructions exist for all employees, and especially for those carrying out hazardous activities. The safety legislation for the activities related to gas handling are very strict so there is no alternative. In addition to that, the parent organization has provided a framework for the development of the safety documentation. Posters and other similar material provided by the parent organization are used to develop employee awareness on the safety issues.
C.3	The organization deals with accidents and emergency situations according to documented procedures, but the relevant cost is not recorded. The health and safety committee does not contribute to the whole situation satisfactorily. Top management and the parent organization determine the way that these issues are going to be managed and implemented, due to the fact that the parent

	organization has to introduce its own policy.
C.4	Safety training programs are systematically carried out.
C.5	The safety manager is also quality manager and supervises environmental issues.
Additional Data	<ol style="list-style-type: none"> 1. The organization is an SME slightly influenced by the fact that a big organization is behind it. The climate between employees and management is not very open-minded as the latter are more stuck to the parent organization and the former feel a little bit «isolated». 2. The number of employees is rather lower than needed and there are some individuals from the middle level that are overloaded with many different tasks. 3. The top management of the organization did not get involved with the quality management system from the beginning, as they considered that the issue was rather technical than managerial. The consultants in a way pressed the top management to get involved, starting from the establishment of the quality policy. After that point, things proceeded much more quickly. 4. In the internal audit that took place two months before the certification audit, an executive of the parent organization took part. Her presence was the catalyst for the success of the audit, as she knew very well the organization's mechanisms (she had worked there for a period of time as a safety manager) and could help the consultants identify organizational weaknesses that they probably would not be able to identify by themselves.

DATA COLLECTION RESULTS SHEET - SME K

Procedure Details	A formal interview based on Interview Checklist A took place with the one of the organization's owners.
A.1.	Processed materials / Publishing annual books relative to marine industry
A.2.	There are four (4) different books that the organizations publishes every year and each of these books includes different kind of information to be used by all types of organizations belonging to marine industry.
A.3.	10 employees / 3 employees are collecting and processing information, 1 employee is carrying out montage activities, 3 employees are carrying out sales activities, 2 employees are carrying out financial and accounting activities and 1 individual is the general manager of the organization.
A.4.	The organization exists for 30 years and it is an SME that started as a family organization, but now the 51 % is owned by a businessman who does not belong to the family and he is not living in Greece, so his relationship with employees is filtered by the other owners.
A.5.	Distinct departments do not exist, only distinct functions can be identified. It cannot be said that there is a process orientation in the organization, as activities are quite often mixed up between employees.
A.6	An overall organized marketing department does not exist and sales are carried out in a limited range of «traditional» customers all around the world. This organization used to be a monopolist and during the last 7 years a number of competitors appear.
A.7	The organization does not implement a quality management system.
A.8	The technological level of the organization is satisfactory in relation to the information collection and processing activities. Publishing activities are carried out by sub-contractors, whose level of technology remains satisfactory.
A.9	Training programs are not provided. Any new-hired employees are on-the-job trained by the other experienced employees. Actually most of the employees have been working there for more than 15 years.
B2.1.	The organization does not have a quality department. Only information verification activities take place.
B2.2.	No quality assurance is provided to the customers, except from the good reputation of the product that has been built over the years.
B2.3	Complaints are very rarely expressed by customers. Relevant records are not kept. The organization does not seem to bother about this issue at all.
B2.4	The owners are not at all informed about quality management systems and ISO 9000 standards.
B2.5	No monitoring about quality performance takes place.
C.1.	The organization's activities are not considered to have environmental impacts.
C.2.	No documented safety procedures exist. Filters are put in front of computer monitors.
C.3	No systematic activities as hazards do not actually exist. Emergency situations have never existed.
C.4	Safety training programs are not carried out.
C.5	There is no delegated responsibility for safety.
Additional Data	1. The organization is struggling to survive because of the competitors who produce exactly the same thing. For this reason, they are trying to develop a service activity, by giving information to companies through telephone or e-

mail. It seems to be practicable, as employees are very experienced and the technology needed is available.

2. The owners are involved in the day-to-day activities and they influence the climate very much (as the interviewee admitted).

DATA COLLECTION RESULTS SHEET - SME L

Procedure Details	A formal interview based on Interview Checklist A took place with the organization's owner who is also the general manager.
A.1.	Processed materials / Production of army garment
A.2.	The production range includes army uniforms, blankets, hats and bags.
A.3.	95 employees / 60 employees are working in the production department, 10 employees are working in the technical support department, 3 employees are carrying out the quality control activities, 8 employees are working in the sales department, 6 employees are working in the financial department, 4 employees are working in the administration and personnel department and 4 individuals constitute the management of the organization.
A.4.	The organization exists for 30 years and it is a family SME now managed by the second generation.
A.5.	The organizational structure is of pyramid type. The distinct departments are: the production department (it includes also the quality control personnel), the technical support department, the sales department and the financial, administration and personnel department. The organization does not carry out design activities.
A.6	The only customer of the organization is the Greek and the German Army and sales are arranged through contracts by the manager / owner. The sales department deals with supporting activities (control of deliveries, distribution etc.). The manager / owner examines possibilities to export to many other countries in Europe.
A.7	The organization does not implement a quality management system.
A.8	The technological level of the organization is satisfactory for its production needs. The manager / owner aims at investing in machines with a higher level of automation for productivity improvement in the foreseeable future.
A.9	Training programs are not provided. Any new-hired employees are on-the-job trained by the other experienced employees.
B2.1.	The organization does not have an independent quality control department. Production employees are carrying out quality control of in-processes products and three employees are carrying out exclusively quality control activities to the final products. Quality assurance activities are carried out in relation to product traceability and to the contract review.
B2.2.	Each delivery is accompanied by a certificate of conformity for the products delivered. This certificate is signed by the manager / owner.
B2.3	Complaints are handled directly by the manager / owner and usually reported to him by employees of the sales department.
B2.4	The manager / owner is well informed about quality systems and ISO 9000 standards. He is aware of the philosophy of standardization because he works always using army standards. He plans to introduce a quality system because he believes that it will help the company internally and externally.
B2.5	Non-conforming products are monitored and recommendations are made to the responsible production employees.
C.1.	The organization's activities are not considered to have major environmental impacts except from the noise pollution, but it is located in an industrial zone and relevant problems never occurred.
C.2.	No documented safety procedures exist. Earplugs are used by employees

	working in the production line. No employee ever had problems with his / her ears.
C.3	In cases of accidents, the organization provides all necessary aid to the injured employee, but there are not any specific procedures in place. The cost relevant to accidents is not recorded. The health and safety committee exists only as a legal requirement and it is not activated.
C.4	Safety training programs are not carried out.
C.5	The responsibility for safety is delegated to the manager of the technical support department.
Additional Data	1. The manager / owner tries to have the overall control as he is not fully satisfied by any member of the management team. He believes that he must be informed for everything because in most cases he has to interfere immediately.

DATA COLLECTION RESULTS SHEET - SME M

Procedure Details	A formal interview based on Interview Checklist A took place with one of the organization's owners who is also the general manager.
A.1.	Software / Development of software applications
A.2.	The software applications are tailored to the customer requirements and most of them are developed over the Internet
A.3.	20 employees / 9 employees are working in the software development department, 4 employees are working in the marketing and sales department, 2 employees are working in the financial department, 2 employees are working in the administration department and 3 individuals constitute the management of the organization.
A.4.	The organization exists for 2 years and founded by three software specialists.
A.5.	The organizational structure is flat. Departments have the meaning of functions (the manager / owner insisted on the word «department») and they are: the development department, the marketing and sales department, the financial department and the administration department.
A.6	The marketing and sales department is very activated as the organization is trying to gain an adequate share in a very competitive market. The three owners personally support the relevant activities and at the same time they are searching the market. The organization does not have foreign customers yet.
A.7	The organization does not implement a quality management system.
A.8	The technological level of the organization is very high, for this is a necessity even for its existence.
A.9	Training programs have not been carried out yet, but the manager / owner is planning to establish a continual training system for all employees.
B2.1.	The organization does not have an independent quality control department. Software is tested in every step of its development procedure.
B2.2.	Before the software package is finally delivered to the customer, a demo application is available.
B2.3	Complaints usually require a service visit of a specialist. These situations are monitored and carefully analyzed because defaults in the software development may be hidden.
B2.4	The manager / owner knows some things about quality management systems and ISO 9000 standards. He is reluctant in getting involved with that because he thinks that a system like that would make things proceeding slower than they do at the moment. It is very important for their business to act quickly and he thinks that the implementation of a quality management system will make the internal mechanisms of the organization less flexible.
B2.5	The customers' satisfaction is the only indicator for the organization's quality performance. It is not evaluated in a systematic way.
C.1.	The organization's activities are not considered to have environmental impacts except from the disposal of the printers' toners; they collect them and return them to the supplier who has the further responsibility for them.
C.2.	No hazardous activities take place. Filters are put in front of all computer monitors. The offices are properly lightened and air-conditioned.
C.3	No accidents or emergency situations are likely to happen. A number of fire extinguishers exist in the offices in case of fire.

C.4	Safety training programs are not carried out because they are not needed.
C.5	No responsibility for safety is delegated
Additional Data	1. The manager / owner's primary concern is the market share that the organization should gain day after day for assuring its survival. He believes that an ISO 9000 certificate is not critical for the sales increase at the moment.

DATA COLLECTION RESULTS SHEET - Consultant 1

Procedure Details	A formal interview based on Interview Checklist B took place with the Quality Consultant 1.
1	A very common difficulty while designing and implementing a quality management system has to do with the overlapping responsibilities of production staff and of quality staff within the organization.
2	Phase 1: Diagnostic study of the current situation and determination / documentation of the product or service requirements (if they are not determined and documented) Phase 2: Comparison of the current situation as it was identified in Phase 1 to the requirements of ISO 9000 standards Phase 3: Design of the quality management system. Personnel training takes place progressively during the whole project.
3	A relationship between the size of the organization and the duration of the project cannot be absolutely defined but normally the bigger the organization is, the less time the project lasts.
4	The 80 - 90 % of organizations decide to introduce a quality management system because of the market's pressure for the ISO 9000 certificate. A number of these organizations become to realize the inner significance of the quality management system for the overall business performance.
5	All managerial levels of production resist more in the quality management system implementation because: <ul style="list-style-type: none"> • their activities are more closely and systematically controlled • they have to change some points in the way that they are used to perform their work, and they resist to these changes.
6	The time-schedule of such projects is always realistic and Consultant 1 has never experienced delays.
7	The personnel's contribution in the phase of the quality system design is usually satisfactory.
8	Personnel's contribution to the phase of the documentation building up is usually satisfactory. SMEs top management's attitude is usually very positive to that, especially to the fact that people will fill forms and keep records.
9	Actually organizations involve production and technical departments in the quality management system implementation project much earlier than the marketing department. That usually happens because of the sales personnel who are not very happy for participating in the whole thing.
10	SMEs usually delegate the responsibility for the quality management system to a person from inside the organization. In many cases, after the ISO 9000 certification, this person is changed. This happens because the SME top management tend to use their best individual for that position during the difficult period before certification, to assure the result. After the certification is achieved, the top management of the organization feel more relaxed and they may allocate a less competent person in that position.
11	All organizations, never ask for consultancy in the area of safety or environmental management. Some of them neglect or do not know their legal responsibilities in these areas.
12	No sound data is available in relation to the internal cost of the quality management system before or after the preparation for certification so conclusions cannot be determined.

13	Most of the organizations maintain the quality management system after the ISO 9000 certification just for keeping on complying to the standard requirements. Very few organizations invest in their quality management system to achieve performance improvement.
14	SMEs need the quality management system to be designed in a flexible way, because less people have to deal with many and quite often conflicting responsibilities.

DATA COLLECTION RESULTS SHEET - Consultant 2

Procedure Details	
1	A formal interview based on Interview Checklist B took place with the Quality Consultant 2.
2	The most important difficulty while designing and implementing a quality management system has to do with the «quality tools» that SMEs very rarely put in place: quality control means (equipment, calibration procedures, personnel training), product or service specification and statistical techniques.
3	Phase 1: Diagnostic study of the current situation Phase 2: Identification of documentation needs Phase 3: Building up the quality management system documentation. Personnel training should take place between Phase 1 and Phase 2.
4	A relationship between the size of the organization and the duration of the project cannot be defined. The project duration is determined by the complexity of the operational processes.
5	Almost all the organizations decide to introduce a quality management system because they want to use the ISO 9000 certificate as a marketing tool. This attitude can only be changed if the top management of the organization has the ability to look at the system closely and identify the opportunities for performance improvement that are given by its implementation.
6	Middle management resists more because <ul style="list-style-type: none"> • these individuals have to activate the quality management system step-by-step and this is a quite competitive task • usually considerable changes must take place in the field of their work.
7	The time-schedule of such projects is always theoretic. Delays take place very often especially in SMEs, due to the fact that the personnel availability is always limited compared to what has been planned.
8	The personnel's contribution in the phase of the quality system design is usually average.
9	Personnel's contribution to the phase of the documentation building up is not always satisfactory. People do not like to give detailed information of how they work.
10	Actually organizations involve production and technical departments in the quality management system implementation project much earlier than the marketing department.
11	SMEs usually delegate the responsibility for the quality management system to a person from inside the organization. The criteria of that delegation are subjective.
12	All organizations, never ask for consultancy in the area of safety or environmental management. Some of them neglect or do not know their legal responsibilities in these areas.
13	If the quality system is tailored to the organizational needs, the internal cost of its operation is very low. If not, then this cost can become very high.
14	Organizations may maintain the quality management system after the ISO 9000 certification for keeping on complying to the standard requirements and not losing the certificate, or they may not maintain it at all. Very few organizations consider quality management systems to be tools for internal improvement.
14	-

DATA COLLECTION RESULTS SHEET - Consultant 3

Procedure Details	
1	A formal interview based on Interview Checklist B took place with the Quality Consultant 3.
2	The most important difficulty while designing and implementing a quality management system is related to the definition of responsibilities and authorities. A critical point is also the rate of the top management's commitment when the project begins.
3	Phase 1: Diagnostic study of the current situation and review of the existing documentation Phase 2: Building up the quality management system documentation (and also modifying the existing). In this phase, the important point is that personnel writes down the draft of the documentation. Phase 3: Training and consultancy for the quality management system implementation. Training activities can also start during Phase 2.
4	The project duration is determined by the complexity of the operational processes. After the quality system is fully designed and implemented in an SME, the certification audit should not take place earlier than a year.
5	Almost all the organizations decide to introduce a quality management system because they want to use the ISO 9000 certificate as a marketing tool.
6	Top management resist more to cost and resources allocation issues. Operational staff resist more to implementation issues.
7	In SMEs, delays take place due to the fact that the personnel availability is limited.
8	The personnel's contribution in the phase of the quality system design is not satisfactory, due to their limited availability.
9	Personnel's contribution to the phase of the documentation building up is not always satisfactory, again due to their limited availability.
10	Actually organizations involve production and technical departments in the quality management system implementation project much more than the marketing department.
11	SMEs usually delegate the responsibility for the quality management system to a person from inside the organization because they cannot afford to hire a new one. They usually provide training to this person for assuring that he / she has the competencies to carry out his / her responsibilities.
12	All organizations, never ask for consultancy in the area of safety or environmental management.
13	If the quality system is tailored to the organizational needs, the internal cost of its operation is going to be reduced after the certification, because things will become more balanced and the internal benefits of the system implementation will begin to appear.
14	Most of the SMEs do not or cannot view the quality management system as an organizational tool that leads to a performance improvement. The reason for that is the top management's lack of knowledge and awareness.
14	-

DATA COLLECTION RESULTS SHEET - Consultant 4

Procedure Details	A formal interview based on Interview Checklist B took place with the Quality Consultant 4.
1	The main difficulty of designing and implementing a quality management system to an SME is related to the lack of knowledge of the staff of all organizational levels. Quality management knowledge cannot be transferred to people during the limited time of one or two seminars, so the project starts and the staff's knowledge of what is going on is inadequate. This is the source of any problem that may occur.
2	Phase 1: Diagnostic study of the current situation Phase 2: Building up the quality management system documentation Phase 3: Consultancy and support for the quality management system implementation. Training activities should be carried out in the beginning (before Phase 1) and continue during the whole project.
3	The project duration is determined by the culture of the organization and has nothing to do with its size.
4	Almost all the organizations decide to introduce a quality management system because they want to use the ISO 9000 certificate as a marketing tool or because major customers have stated a relevant requirement.
5	If top management does not resist to the arrangements needed for the quality management system implementation, then nobody else resists or expresses a kind of resistance. If not, the whole effort collapses.
6	It depends on the culture of the organization. If the climate is positive, delays do not normally occur. In different situations, the duration of the project could be doubled.
7	The personnel's contribution in the phase of the quality system design is satisfactory if the top management has clarified that requires so.
8	Personnel's contribution to the phase of the documentation building up is not always satisfactory, even if they are willing to do so, due to the fact that people usually find difficult to express what they do or how they work in written.
9	Organizations involve production and technical departments in the quality management system implementation project much more than the marketing or sales department, due to lack of knowledge. Very few managers of organizations know that the implementation of ISO 9000 standards are not exclusively related to production and quality control activities.
10	SMEs usually delegate the responsibility for the quality management system to a person from inside the organization because they cannot afford to hire a new one. This is good and bad: good because that person knows well the way the organization operates, bad because usually he / she does not have adequate competencies to carry out the whole work; if a new person was hired, it would be chosen upon criteria relevant to his / her knowledge and experience in the area of quality management.
11	Organizations never ask for consultancy in the area of safety or environmental management.
12	Only if the quality system is tailored to the organizational needs, the internal cost of its operation is going to be reduced as soon after the certification, but this will not happen immediately. The system has to become more mature and usually organizations are not patient enough to wait.

13	SMEs do not or cannot view the quality management system as an organizational tool that leads to a performance improvement. The reason for that is the top management's lack of knowledge and awareness. After a long period of time, the system will either become a really valuable tool or disappear.
14	Top management of organizations of all sizes may be very keen of gaining the ISO 9000 certification but they are not aware of the situation. Unfortunately, in many cases their awareness remains in low levels even if the certificate is gained.

DATA COLLECTION RESULTS SHEET - Consultant 5

Procedure Details	A formal interview based on Interview Checklist B took place with the Quality Consultant 5.
1	The most difficult element in the quality management system design and implementation project is the balancing between documentation necessity and bureaucracy. It is important to keep this balance because the attitude of the staff to the whole project is strongly influenced by the additional work or the increase of work complexity resulted from the quality management system implementation.
2	Phase 1: Diagnostic study of the current situation and review of the existing documentation Phase 2: Design of the quality management system and identification of documentation needs. Phase 3: Training and consultancy for the quality management system implementation. Training activities can also start from Phase 1.
3	The project duration is determined by the complexity of the operational processes and the availability of the key employees (quality representative, line managers etc.)
4	All the organizations decide to introduce a quality management system basically because they want to use the ISO 9000 certificate as a marketing tool. A limited number of organizations also believe that such a system can help the overall performance of the organization.
5	Middle management resist more to the quality management system implementation, because they have to contribute to both design and implementation and they have a strong feeling that their work changes very much.
6	In SMEs, delays take place due to the fact that the personnel availability is limited because each individual plays a number of roles. This fact causes additional problems because these roles often conflict within the framework of a quality management system, e.g. in most SMEs the production and quality control activities are supervised by the same person.
7	The personnel's contribution in the phase of the quality system design is not satisfactory, due to their limited availability.
8	Personnel's contribution to the phase of the documentation building up is not always satisfactory, again due to their limited availability and to the fact that they are not willing to write down things.
9	If the SME has an organized marketing department, this department is normally involved in the quality management system implementation project, slightly less than the production and technical departments. As this does not always happen in SMSs, marketing and sales activities remain out of the project for most of its duration.
10	SMEs usually delegate the responsibility for the quality management system to a person from inside the organization because they are not willing to hire a new one. This is the best solution because a person from inside already knows hoe the organization operates and this facilitates the project. What is necessary is to provide that person with the necessary training for fulfilling his / her new responsibilities.
11	All organizations, never ask for consultancy in the area of safety or environmental management.

12	The internal cost of the quality management system operation should be reduced after the certification, because things will become more balanced and the internal benefits of the system implementation will begin to appear. Actually organizations do not monitor this cost (before or after the certification) so data is not available to prove the view stated above.
13	Most of the SMEs do not view the quality management system as an organizational tool that leads to a performance improvement unless they have this opinion from the beginning of the project. Few organizations discover the quality management system value afterwards.
14	-

DATA COLLECTION RESULTS SHEET - Consultant 6

Procedure Details	
1	A formal interview based on Interview Checklist B took place with the Quality Consultant 6.
2	A very common difficulty while designing and implementing a quality management system in an SME has to do with the clarification of responsibilities and authorities among staff.
3	Phase 1: Diagnostic study of the current situation Phase 2: Comparison of the current situation as it was identified in Phase 1 with the requirements of ISO 9000 standards and creation of a list of necessary activities. Phase 3: Design of the quality management system and preparation of the documentation. Personnel training should preface the whole project.
4	The duration of the project is influenced by the complexity of the operational processes and the existing organizational structure.
5	The organizations almost always decide to introduce a quality management system because some of their major customers demand it.
6	Operational staff resist more in the quality management system implementation because they feel that a considerable amount of work is added.
7	Delays always occur in such projects due to many unpredictable causes.
8	The personnel's contribution in the phase of the quality system design is usually positive.
9	Personnel is not very willing in writing down the things they do. Top management considers the staff's involvement in documentation very fruitful, because this process will make them more conscious of their activities.
10	Organizations involve production and technical departments in the quality management system implementation project much earlier and more intensively than the marketing department. This happens because the relationship between ISO 9000 and customers is understood only in terms of gaining the certificate.
11	SMEs usually delegate the responsibility for the quality management system to a person from inside the organization.
12	Organizations never ask for consultancy in the area of safety or environmental management. They do not relate safety and environmental protection with the word «management».
13	The internal cost of the quality management system operation is not calculated by the organizations, so no opinions can be expressed on that point.
14	Most of the organizations do not realize the value of the quality management system for their overall performance. This happens because during the quality management system design and implementation project, people and consultants are obsessed with achieving certification and they do not look deeper to the system itself.
14	-

DATA COLLECTION RESULTS SHEET - Consultant 7

Procedure Details	A formal interview based on Interview Checklist B took place with the Quality Consultant 7.
1	The most difficult issue that is faced while designing and implementing a quality management system in an SME is the awareness of staff from all the organizational levels. The role of the top management is critical, if they will not lead all the people to the new thinking, nobody else will.
2	Phase 1: Diagnostic study of the current situation Phase 2: Documentation building up and personnel training Phase 3: Consultancy and support for the proper implementation of the quality management system for a period of time before the ISO 9000 certification audit takes place.
3	The duration of the project is influenced by the complexity of the operational processes and the availability of people that are key to the project.
4	The organizations almost always decide to introduce a quality management system for gaining an ISO 9000 certificate that will help them enter wider markets.
5	Operational staff resist more in the quality management system implementation because they feel that their work is more controlled and they become more responsible for their activities.
6	Delays are usually caused due to the limited availability of staff.
7	The personnel's contribution in the phase of the quality system design is usually positive.
8	Personnel contribute to the preparation of documentation reluctantly. They usually feel uncertain of what they write and they prefer to avoid taking responsibilities.
9	Organizations involve production and technical departments in the quality management system implementation project earlier than the marketing department. Marketing department staff usually have the idea that ISO 9000 has to do with the technical staff and not with their activities and they are usually unwilling to get involved in the project.
10	SMEs may delegate the responsibility for the quality management system to a person from inside the organization or hire a new person. According to her experience, Consultant 7 finds the former more usual than the latter.
11	Organizations never ask for consultancy in the area of safety or environmental management. In the area of safety, they only try to fulfill their legal obligations.
12	The internal cost of the quality management system operation is lower after the certification, if the quality management system is appropriately designed.
13	To consider the quality management system as a means for the overall performance improvement, an organization must either have this opinion from the first moment, or experience the system's operation and monitor quantitative elements in relation to its effectiveness and efficiency.
14	-

DATA COLLECTION RESULTS SHEET - Consultant 8

Procedure Details	
1	A formal interview based on Interview Checklist B took place with the Quality Consultant 8.
1	The most important difficulty of the quality management system design and implementation project is the awareness of staff from all the organizational levels. This determines the way that the whole project is going to be carried out and the quality of the project's results.
2	Phase 1: Diagnostic study of the current situation and identification of gaps between the situation and the standards requirements. Phase 2: Design of the system, documentation building up and personnel training Phase 3: Consultancy and support for the proper implementation of the quality management system.
3	The duration of the project is not related to the size of the organization, except from the point that the increased availability of bigger organizations' staff may facilitate the project. The complexity of operational processes plays a very important role to the duration of the project.
4	The organizations almost always decide to introduce a quality management system for being ISO 9000 certified and using the certificate as a marketing tool.
5	Middle management resist more in the quality management system implementation because they feel that the documentation and control mechanisms will abolish their exclusivity of deeply knowing business processes.
6	Delays are very usual in SMEs due to the facts that: <ul style="list-style-type: none"> • the availability of staff is limited • the rate of staff awareness is very low and thing cannot be easily understood • the organizational structure is weak to support a new system quickly.
7	The middle management's contribution in the phase of the quality system design is not positive.
8	Personnel contribute to the preparation of documentation unwillingly, because they dislike writing. From the other hand, top management supports the development of documentation because they believe that documentaion and quality records will help them control their own business.
9	Organizations involve production and technical departments in the quality management system implementation project earlier than the marketing department. This happens because they have the idea that quality is a matter of producing and not of selling.
10	SMEs usually delegate the responsibility for the quality management system to a person within the organization.
11	Organizations never ask for consultancy in the area of safety or environmental management.
12	The internal cost of the quality management system is very rarely monitored, so there is not evidence available to give a clear idea of that issue.
13	Organizations, due to the fact that they are focused on certification, they do not examine the possibilities of using the quality management system as a means for overall performance improvement. Top management can assess this possibility after certification. Surely, a system that is designed just to superficially satisfy the standards requirements cannot help internally the organization.

14

SMEs and also bigger organizations need to develop a proper culture if they want to be benefited by the implementation of a quality management system.

	initial management meeting that takes place during the certification audit, the only participants were the general manager and the quality representative, as no other managers existed and authority had not been delegated to people from lower level.
B.4.	It appears to be acceptable but some gaps are always found.
B.5.	If the environmental and safety registration relevant to the organization's activities is strict, then its performance in these areas is acceptable. If not, in most cases things are not at all satisfactory.
B.6.	Almost never.
B.7.	In most cases organizations demonstrate that they have set quality objectives and indices of their quality performance. Relevant results are very rarely demonstrated.
B.8.	The operational management people are more aware of ISO 9000 because, finally, these are who mostly work with it as the operational level procedures are incorporated in their daily activities.
B.9	The quality representative is usually an employee of the organization.
B.10.	<ul style="list-style-type: none"> • Management review has not taken place • Internal audit has been carried out superficially • Ineffective documentation control • Inadequate supplier evaluation.
B.11.	Almost all organizations are initially interested in just gaining the certificate.
B.12.	Companies always feel uncomfortably with the assessor of a Certification Body. They feel that this person is there not to verify that the standard requirements are fulfilled but to find out mistakes and non-compliances. Consultants feel more comfortably, due to the experience they have from audits.
C.1.	During the first annual surveillance the SMEs quality management systems are often found to be in the same situation as the were during the certification audit.
C.2.	After the certification, organizations communicate with the Certification Body - only for typical reasons or for asking questions relevant to the validity or the scope of their certificate.
C.3	Organizations do not loose their certificate very often - and those losing it are not usually SMEs. Actually when an SMEs achieves to be certified, it exploits the certificate very much and does not tolerate to lose it. The reason for losing a certificate is the occurrence of major non-compliance due to the fact that the company has «abandoned» the quality management system.
C.4	As it can be seen in the annual surveillances, there is a number of SMEs that they use the quality management system as an organizational tool after they are certified, but this number should be bigger.
C.5	This depends on whether the company has actually used the quality management system as an organizational tool. If yes, then the quality management system certainly becomes more mature as time passes.

DATA COLLECTION RESULTS SHEET - Certification Body 2

Procedure Details	
	A formal interview based on Interview Checklist C took place with an assessor of the Certification Body 2.
A.1.	The SMEs representatives are in a phase of investigating the situation when they meet an assessor of a Certification Body. Of course they have an idea of the basic things e.g. the quality management system documentation. It cannot be said that they are really aware of what a quality management system is and the mechanism of the ISO 9000 certification procedures, but they have started to «touch» these issues. Some people are misled by consultants who present the situation either easier or more difficult than it is actually.
A.2.	Usually SMEs representatives meet the assessor together with their consultants to feel more secure. Organizations almost always hire consultants to carry out the quality management system design and implementation project.
A.3.	Self-assessment questionnaires are usually filled in such a way that the quality management system is presented as ideal. These questionnaires mostly cover typical issues and do not actually facilitate the certification audit.
A.4.	A number of organizations disappear after their initial contact with the Certification Body. This happens because some of them want to collect data also from other Certification Bodies and others are discouraged about their current situation. Some of the organizations that have disappeared, contact again the Certification Body after a number of months. The time between the initial conversation and the certification audit is at least one (1) year.
A.5.	They may ask for consultancy but it cannot be provided. They ask for some support because they want to bring the assessor close to the organization before the certification audit, and also because they feel more secure if they hear what is important for achieving certification from the mouth of an assessor.
B.1.	Many organizations ask for a pre-assessment audit. In these audits the quality management systems are generally found to meet the ISO 9000 standard requirements in a percentage of 70 - 80 %.
B.2.	Corrective actions always take place between the pre-assessment audit and the certification audit and they are recorded.
B.3.	<p>The most common weaknesses of SMEs quality management systems are the following:</p> <ul style="list-style-type: none"> • insufficient documentation and / or documentation that is not tailored to the characteristics of the particular company • gray areas in the definition of responsibilities and authorities due to the fact that key individuals cover more than one position • inadequate involvement of top management in the quality management system that is reflected to the quality policy that is poorly stated and to the quality objectives that they may not be in consistency with the quality policy <p>The first weakness is related to a generic approach of the quality management system documentation that is often adopted by consultants and does not fit to the needs of each particular organization. The other two weaknesses actually reflect organizational weaknesses.</p>
B.4.	Many differences can be identified between the content of documentation and the actual operations of the organization, if documentation is examined in detail.
B.5.	The organization's performance towards environmental and safety issues is not

	satisfactory.
B.6.	Never.
B.7.	It depends on the time that the quality management system has been implemented before the certification audit. Most SMEs hurry to be certified so, inevitably, the data collected to demonstrate the existence and the efficiency of the system is inadequate.
B.8.	The operational staff are more aware of ISO 9000 because, they have felt the changes directly in the way they work and, they may identify the benefits or problems these changes have resulted to.
B.9	The quality representative has to be an employee of the company and that usually happens.
B.10.	<ul style="list-style-type: none"> • Internal audit has not been carried out • Training needs are not identified • Statistical techniques have not been selected and implemented • Criteria for the supplier evaluation have not been determined
B.11.	Almost all organizations are interested only in gaining the certificate.
B.12.	Organizations always feel that the assessor of a Certification Body is a person that will control their activities and identify their weak sides. This situation is never pleasant. Consultants also do not feel comfortably with assessors as their work is also assessed.
C.1.	During the first annual surveillance the SMEs quality management systems are often found to be in a slightly worse situation as they were during the certification audit, in terms of implementation.
C.2.	After the certification, organization communicate with the Certification Body only for typical reasons, e.g. arrangements of the annual surveillances.
C.3	Organizations do not loose their certificate very often. The reason for losing a certificate is the occurrence of major non-compliance due to the fact that the organization has «abandoned» the quality management system.
C.4	Very few SMEs actually use the quality management system as a means for achieving internal benefits. Most companies just try to keep on meeting the standards requirements.
C.5	The maturity of the quality management systems of SMEs usually is not found to be impressively increased during the annual surveillances or the re-certification audits.

DATA COLLECTION RESULTS SHEET - Certification Body 3

Procedure Details	A formal interview based on Interview Checklist C took place with an assessor of the Certification Body 3.
A.1.	Usually SMEs representatives contact the Certification Body after they have started and proceeded an ISO quality management system design and implementation project. So, they have already clarified some things and they know more or less what is the quality management system and what is ISO 9000. But talking about awareness, they do not seem to be really aware of what a quality management system can offer to an organization.
A.2.	SMEs prefer to be represented by their consultant during the first telephone contacts with the Certification Body. When a meeting takes place, usually SMEs representatives come together with their consultants. Organizations almost always hire consultants to carry out the quality management system design and implementation project, unless they have a quality management specialist among their personnel.
A.3.	Self-assessments questionnaires are very simple so organizations almost always fill them up correctly. These questionnaires mostly cover typical issues and do not actually facilitate the certification audit.
A.4.	Some SMEs disappear after their initial contact with the assessors and this happens for two reasons: <ul style="list-style-type: none"> • they finally choose another Certification Body (e.g. for economic reasons) • they realize that they are not ready for being audited and some of them may feel discouraged. The time between the initial conversation and the certification audit varies. A general estimation cannot be made.
A.5.	They ask for some advice about the critical points of a quality management system to comply with ISO 9000 standards. They usually have a cooperation with a consultant when they contact the certification Body so they do not ask the assessor for consultancy.
B.1.	Almost all organizations ask for a pre-assessment audit. In these audits SMEs are vary rarely found to be ready for a final audit. The percentage of organizations' compliance with ISO 9000 standards requirements varies.
B.2.	Some corrective actions indicated by the assessors take place between the pre-assessment audit and the certification audit and they are usually recorded. SMEs always demonstrate the relevant records, to underline that improvement has taken place.
B.3.	The most common weaknesses of SMEs quality management systems are the following: <ul style="list-style-type: none"> • inadequate determination of responsibilities and authorities (organizational weakness) • low level of employee awareness • loose relationship between the quality management system and the leadership of the SME (organizational weakness)
B.4.	Documentation of the quality management system is usually very generic and it does not address to the real working conditions or arrangements. This happens because consultants prepare the documentation and the contribution of personnel is inadequate, so it is not fully tailored to organizations' operations.
B.5.	The SMEs' performance towards environmental and safety issues is not satisfactory. If the relevant environmental and safety legislation is strict

	(depending on the nature of organization's activities), the situation is better.
B.6.	Never.
B.7.	The data relevant to the existence and efficiency of the quality management system is almost always inadequate and superficial, especially in SMEs, where the internal monitoring mechanisms, if existed, are very poor.
B.8.	If top management is aware of ISO 9000, then the level of awareness is generally satisfactory throughout the whole organization. If not, then no managerial level is really aware of ISO 9000. There may be individuals whose awareness is exceptionally increased.
B.9	The quality representative has to be an employee of the organization and that usually happens.
B.10.	<ul style="list-style-type: none"> • Internal audit has not been carried out • Management review has not been carried out • Control of non-conforming products is inadequate
B.11.	Most organizations just want the certificate.
B.12.	Organizations do not like assessors. Consultants also do not feel comfortably with assessors as their work is assessed.
C.1.	During the first annual surveillance the SMEs quality management systems are more or less in the same situation as they were during the certification audit. Impressive changes are rarely found.
C.2.	After the certification, organization communicate with the Certification Body only for typical reasons.
C.3	The reason for losing a certificate is the occurrence of major non-compliance in key elements of ISO 9000 standards, e.g. management responsibility, internal audits etc. Very often this non-compliance is related to the fact that the quality management system did not actually served the organization's needs, so it was silently rejected in all levels. A number of SMEs lose their certificate.
C.4	SMEs do not know how to use the quality management system as an organizational tool. Consultants prepare them just for the certification.
C.5	Very often quality management systems are static. Referring to their maturity, no significant improvement is identified.

APPENDIX C: PARTIAL IMPLEMENTATION OF THE PARTICULAR TOOLS OF THE IMS ROUTE-MAP TO SMES

In Appendix C, the partial implementation of the particular tools of the IMS route-map in SMEs A and C (see Table 1/1) and the results of the implementation that are considered as a pilot evaluation of the tools are presented.

All the particular tools of the IMS route-map were partially implemented in SMEs A. In SME C, the MI tool and the QSE tool were implemented.

It should be underlined that the extent of the implementation of the tools in SME C is limited compared to their implementation in SME A, due to the fact that the thesis author, as a quality director in SME A, had the opportunity to closely examine and support the tools implementation, whereas in SME C she only had the opportunity to initiate some of the tools, so their implementation proceeded considerably less than it happened in SME A. Nevertheless, the implementation of the tools in SME C had specific results which can be taken under consideration for the partial validation of the tools.

The presentation of the partial implementation of each tool to each one of the two (2) SMEs, is based on the following points:

- the activities, arrangements and changes that took place through the implementation of the tool
- the difficulties that were faced and / or problems that occurred
- the results of the implementation of the tool.

C.1 Implementation of the particular tools of the IMS route-map to SME A

C.1.1 Implementation of the MI tool

Introductory elements

SME A had a very weak performance in relation to the marketing activities, as it has been presented in the respective Data Collection Results Sheet (see Appendix B). The activities of the personnel of commercial department were mainly focused on order receiving and processing. Sales activities were carried out by the organization's representatives to geographic areas, but these individuals acted in isolation and no efficient communication paths between them and the organization really existed. The commercial department did not have a director and was typically supervised by the director general who actually specified the pricing policy and determined prices.

Technical communication with customers was not carried out in a systematic way. In cases where the manufacturing director had a personal conduct with a customer, technical issues could be discussed.

Internally to the organization, personnel of commercial department were not close to all other processes. Most of them did not know the basic technical characteristics of products. Their communication with other departments was insufficient and, quite often this situation resulted to customer complaints (e.g. in cases of insufficient communication between the person who took an order and the supervisor of distribution).

Another issue has to do with the fact that the personnel of commercial department were very much criticised by the rest of the personnel of the organization, as inefficient and low-skilled (as it usually happens to organizations in which the selling volumes are reduced due to competition). This criticism was extended throughout the whole organization and, sometimes it reached customers.

Activities that took place through the implementation of the tool

A number of internal and external marketing activities related to those proposed by the MI tool were initiated, which are outlined below. The thesis author, as the quality director of SME introduced them and examined their implementation very closely.

Internal marketing activities

1. Short training course of the personnel of commercial department

A short training course with a total duration of fifteen (15) hours took place and was attended by all employees of the commercial department. The quality director was the

trainer. The aim of this course was to make these individuals realize their new role in the framework of the MI tool.

The content of the course was focused on the following issues:

- the prime role of marketing staff in achieving customer satisfaction
- the role of marketing staff as an interface for organizational communication with all interested parties
- the role of marketing staff in relation to technical internal and external communication.

These employees had attended the quality courses that took place when the quality management system was introduced, so they were familiar with the basic concepts of customer requirements, needs and expectations and customer satisfaction.

The course took place during a week (3 hours per day), after working hours. The director general was present during the first and the last day of the course and supported the overall effort.

2. Short meetings for the translation of the concepts of customer satisfaction to all personnel of the organization

For achieving to make all personnel adequately aware of the concepts of customer satisfaction, short meetings were organized between employee teams of different departments and organizational levels. During these meeting, an analysis of the way that every business process is linked with customer satisfaction was made. Introductory points were given by the quality director, but after a number of meetings, the responsibility of that activity was transferred to the employees of the commercial department. All participants expressed their thoughts and asked questions.

The key issue relied on the fact that individuals carrying out different tasks and from different levels of responsibility, were approaching the issue of customer satisfaction in common, so awareness was developed spherically. There were cases of employees who had not realized the significance of their role to customer satisfaction before (e.g. the drivers of the lorries that transported products to customers).

3. Investigation, analysis and presentation of the causes of customer complaints to all employees of the organization

Customer complaints were reported normally according to the relevant established procedure of the quality management system. The new thing was that the causes of complaints were investigated more deeply and the responsibility was transferred from the quality director to personnel of the commercial department, to reinforce their role in relation to customer satisfaction. The quality director participated in the investigation.

In figure 1/C, a Pareto Analysis histogram is presented for the customer complaints reported during 1998. This histogram was issued by the commercial department every month and was progressively completed. During the short meetings described in point

2, the monthly Pareto Analysis histogram was presented and discussed. All employees had access to that histogram and they were by their leaders as soon as it was issued.

4. Analysis of the social characteristics of the community in the town where the organization is located and determination of its profile – Presentation of results to employees

The employees of commercial department with the quality director carried out an analysis of the socio-economic characteristics of the community in the town where the organization was located, to determine its profile. This analysis was based on data collected from the local Chamber of Industry and Commerce, Ministry of Labour and other local organizations. The main elements of the physiognomy of the town were the following:

- the local community suffered from unemployment
- young people are disappointed from the industry sector, since many plants have stopped their operation and they are mostly oriented to tourism and service sectors, due to the fact that the town is near the sea and tourism has a potential to be developed
- the social trends of (mostly young) people are strongly influenced by the life style of people living in Athens, due to the fact that the town is just 85 Km from Athens.

All elements were analytically documented together with the fact that SME A seemed to have a significant role to play in the local community, since it was the only important industry that remained open and had a historical background of 75 years of operation in that town. The overall conclusions were presented to employees of the organization and an open conversation took place, in relation to the role of SME A in the local community.

5. Creation of a central archive with all standards, models, regulations, legislation and other obligatory documentation related to the activities of the organization

A central archive, including all the standards, models, regulations, legislation and other obligatory documentation related to the activities of the organization, was created by employees of commercial department. They started to communicate with the relevant organizations, helped by the manufacturing director and the quality director. To carry out this activity, they cooperated also with the occupational health and safety committee and they had the opportunity to explain to its members that the commercial department would start to facilitate the operation of the committee by communicating the safety concepts to all personnel.

6. Establishment of a framework for increasing all personnel awareness of health and safety issues

As a next step of the activities described in point 4, the employees of commercial department proposed to the members of the occupational health and safety committee to create a framework for increasing all personnel awareness of health and safety issues. This framework would initially include messages promotion through posters

and relevant material and the preparation of a leaflet with illustrations relevant to employee participation for achieving safety. These activities were not accomplished.

External marketing activities

1. Creation of a new product catalogue where products were more clearly defined

It was identified that some problems occurred in order taking, due to the fact that customers did not have an updated catalogue of the organization's products and the relevant codes. A new catalogue was prepared by the personnel of commercial department and sent to all customers.

2. Change of the order taking process

The order taking process, in cases of products of the commercial series, changed with the introduction of a very simple checklist that an employee should have in front of him / her while taking an order. This checklist included all issues related to the product that should be clarified, because, even in cases of customers purchasing products from the organization for a number of years, misunderstanding or inadequate determination of requirements took place. The employee had to quickly run through the list and complete the order form respectively. The new arrangements in order taking process were documented.

3. Establishment of a procedure to complaint response

Complaint response is different from investigation and analysis of causes of customer complaints, which is an internal marketing activity. Complaint response has to do with how efficiently the organization reacts to a customer complaint, to minimize customer dissatisfaction. It was observed that, in many cases, priority was given to the investigation of the cause rather than to respond to the customer. This was resolved through the establishment of a procedure including:

- arrangements and time limits for the initial response to the customer, in relation to the seriousness of the complaint
- arrangements for managing recalls
- arrangements for product replacement, if needed, and for informing the customer about the cause of the occurrence of the non-compliance, as soon as it was investigated.

4. Establishment of an assessment system for sales representatives

The establishment of an assessment system for sales representatives took place with the involvement of the director general. Five (5) categories of criteria were determined:

- criteria related to the achieved sales volumes (relevant significance 30 %)
- criteria related to credit control (relevant significance 20 %)
- criteria related to bringing new customers (relevant significance 20 %)

- criteria related to bringing back lost customers (relevant significance 152 %)
- criteria related to the overall communication with customers (relevant significance 15 %)

The implementation of the assessment system was not fully carried out within the duration of the research project.

5. Development of a plan of activities to improve the local community satisfaction level in relation to the performance of the organization

Employees of commercial department developed a plan of activities aiming at improving the local community satisfaction level in relation to the performance of the organization. The most important of the proposed activities were the following:

- The organization would inform all local schools that groups of children could visit the plant. Groups would be accompanied by engineers who would explain them everything and safety would be assured.
- The organization would start to cooperate with the local public technical training centres in terms of searching for solutions to a number of technical problems. Additionally, the organization would accept students to for practice during summer months.
- The organization would resolve the problems of noise pollution caused by the nail production unit, by progressively reconstructing the room in which the unit operated. A two-year time schedule was set.

Difficulties and problems

The most serious difficulty was the attitude of the rest personnel towards the presence of the employees of commercial department to the frontline of activities linked with a much wider area of concern compared to that of order taking and order processing. People asked why the commercial department was involved in this or that, which means that they could not understand or they did not want to accept the new role of these individuals. As time passed, and the overall effort was supported by the director general, most of them got familiar to that new role, but there was a need not only to get familiar to that, but to consciously accept it. Especially the members of the occupational health and safety committee were totally negative to cooperate with the employees of commercial department for issues that were related to health and safety. During the whole effort, the members of the occupational health and safety committee did not participate to that satisfactorily. The reason of their attitude may be related to the fact that they felt that interference to their field of responsibility took place.

The time availability of employees of the commercial department did not appear to be a problem. The only problem related to their attitude was a feeling of inconvenience when they started to get involved with a number of new things.

Results of the implementation of the tool

- The most outstanding result has to do with the fact that the passive personnel of commercial department became active and undertook its critical role in relation to the customer satisfaction internally and externally to the organization. By this activation competencies and talents emerged from employees of the commercial department.
- Activities that would improve the profile of the organization in the local community were planned, and some of them were accomplished (e.g. the cooperation with schools and training centres).
- The investigation of customer complaints by employees of the commercial department make them carry out a “quality control” of the overall organizational performance, as it has to happen when marketing activities take place. By communicating the causes of complaints throughout the organization, performance improvement was achieved, as it can be seen in figure 1/C for 1998.
- Improved procedures were established in relation to the review of customer requirements and the response to customer complaints.
- For the first time, the issue of assessing sales representatives in a systematic way was approached by the determination of specific criteria.
- The issues of evaluating the rate of employee satisfaction, which are included in the initial marketing activities set by the MI tool, were not addressed in this partial implementation of the tool in SME A.

C.1.2 Implementation of the QSE tool

Introductory elements

SME A performs a great variety of processes related to production and technical support and also to other functions and operations (e.g. distribution, shipping, order taking etc.). There are also many distinct locations in the premises of SME A. For the partial implementation of the QSE tool, two (2) processes and two (2) distinct locations were selected, for which the implementation of the tools would expect to give representative and adequate results.

The selected processes were:

- the process of shipping wire coils (P1)
- the wire galvanization process (P2)

The selected distinct locations were:

- storing places of final product (I1)
- production line of copper coated welding wire (I2)

Activities that took place through the implementation of the tool

Phase A – Definitions

In this phase, the processes and distinct locations were defined.

The **shipping process (P1)** was defined as follows:

Step 1: Clark enters the storing place

Step 2: Product units (wire coils) are loaded on clark helped by a person

Step 3: Clark moves from the storing place to the lorry

Step 4: Product units (wire coils) are shipped on the lorry.

The **wire galvanization process (P2)**, based on the method of hot dip galvanization, was defined as follows:

Step 1: Full spools of bright wire are loaded on turning bases

Step 2: Wire passes through the annealing furnace

Step 3: Wire exits from the annealing furnace to the air

Step 4: Wire dips in bath of hydrochloric acid

Step 5: Wire exits from the bath of hydrochloric acid and immediately dips in a water bath

Step 6: Wire passes through a drier

Step 7: Wire dips in the bath of flux

Step 8: Wire exits from the bath of flux in an angle of 30o and immediately water falls on it to cool it

Step 9: Wire is wound on formers.

Storing places of final product (I1) were defined as closed places where final and packed products are stored until they are shipped.

The **production line of copper coated welding wire (I2)** was defined as the area within which all steps of the process of producing copper coated welding wire take place.

Phase B – Identification and linking of elements

Process P1

All steps of process P1 are linked with the safety and environmental parameters, since:

- as clark enters and moves in a closed place in may come to a contact with a person
- as clark moves, there are pollutant emissions on the air that could affect people working in the closed storing place, and, at the same time these emissions have an environmental impact.

Steps 2,3 and 4 are linked with the quality parameter, since, if the driver of the clark does not operate the loading mechanism with caution, or if the mechanism does not operate properly, damages to wire coils may be caused.

Process P2

All steps of process P2 are linked with the quality parameter, since the process is continuous and the operation conditions have to be continuously monitored and controlled.

All steps of process P2 are linked with the safety parameter, since workers carry out their work close to the production line and may come to a contact with the product-in-process or the installation. Additionally, toxic vapours exist in the whole length of the galvanization line and also flammable materials are used.

Step 2 is linked with the environmental parameter, since the annealing furnace produces pollutant emissions in the atmosphere.

Steps 4,5 and 7 are linked with the environmental parameter, since the liquids are aqueous solutions that are directed to the sea (after passing through a cleaning and recycling unit).

Location I1

Location I1 is linked with the quality parameter, since the storage conditions can affect considerably the quality of the final product (e.g. humidity causes oxidation to the galvanized surface of the wire and the product loses its shine). It is linked with the environmental parameter, since transports with clarks take place and contacts with people may occur. It is linked also with the environmental parameter, in terms of waste packaging material that is usually thrown.

Location I2

Location I2 is linked with the quality parameter, since a production operation takes place and improper conditions may affect the quality of the product. It is linked with the safety parameter, since machinery and equipment exist and, if an operation problem occurs or a human mistake takes place, it may cause an accident. In addition to that, flammable materials are stored in that location. It is linked with the environmental parameter, due to the fact that a lot of waste material exists there.

Phase C – Relative Significance of Elements

Figure 2/C illustrates the relative significance (%) of the IMS elements for the selected processes and locations. The determination of the relative significance of the IMS elements was based on the criteria set by the tool (see 3.2.2) but it was mostly qualitative, due to the fact that a fully detailed analysis could not be carried out during that period of time. The determination of the relative significance was carried out by the quality director, in cooperation with the manufacturing director.

Phase D – Cause Analysis

Cause analysis was based on the following categories of dependence on the elements of the IMS:

- dependence resulted from equipment / “Function e”
- dependence resulted from materials / “Function m”
- dependence resulted from the human parameter / “Function h”
- dependence resulted from production operations / “Function p”
- dependence resulted from physical conditions / “Function c”

Cause analysis gave the following results:

P1: e(Q,S,E) , h(Q,S), which means that for the process P1, safety points of concern are related to the equipment used and to the human parameter, environmental points of concern are related to the equipment used and the quality points of concern are related to the equipment used and to human parameter.

P2: e(Q,S,E), m(Q,S,E), h(Q,S,E), p(Q,S,E), which means that for process P2, quality, safety and environmental points of concern are related to the equipment used, to materials, to the human parameter and to production operations.

I1: e(S), m(E), h(S), c(Q), which means that for location I1, safety points of concern are related to the equipment and to the human parameter, environmental points of concern are related to materials and the quality points of concern are related to physical conditions.

I2: e(S), m(S,E), h(S), p(Q), which means that for location I2, safety points of concern are related to the equipment and to the materials and to the human parameter, environmental points of concern are related to materials and the quality points of concern are related to production operations.

These functions could be furthermore analyzed but during that period of time the necessary technical data was not available.

Phase E – Action Planning

For P1, the following action plan was prepared:

- A detailed technical examination should be carried out for assuring the suitability of every clark. A full maintenance program for clarks had to be developed and implemented. Relevant records would be kept for every clark (priority 1).
- A training program to clark drivers, emphasizing on quality and safety issues would be carried out (priority 2).

For P2, the following action plan was prepared:

- The process was very critical in relation to all parameters and through all functions, so it should be assigned to a specific process owner (priority 1).
- A technical examination program should be prepared for each particular component of the production line, for detecting hidden problems (priority 2).
- An automatic system of continuous monitoring of operational parameters should be purchased and installed (priority 3).

For location 11, the following action was determined:

- A system of air conditioning and controlling of humidity would be purchased and installed (priority 1).

For location 12, the following action plan was prepared:

- An overall examination of the equipment placed in location 12 would be carried out for detecting hidden problems (priority 1).
- A procedure for materials handling in the area of location 12 should be prepared and implemented (priority 2).

Action plans were approved by the director general.

Difficulties and problems

Since this was the first attempt that had ever been made in SME A to approach processes and locations through the quality, safety and environmental parameters, the overall procedure could not go to the very detail, because the required data was not available. The implementation of the tool in SME A is considered as an initial approach to quality, safety and environmental functions for the selected processes and locations.

Results of the implementation of the tool

It is obvious that the QSE tool worked, even through its initial approach. Action plans were prepared, but the most important result of the implementation of the tool was that a systematic and integrated approach of processes and locations was carried out and was documented.

C.1.3 Implementation of the L tool

Introductory elements

The supply chain management activities in SME A were not systematically designed and their cost effectiveness was very low. There was an objective reason for that, which burdened the situation: the flow of material was not carried out in a logical sequence in the plant, due to the fact that the plant was developed step by step and without having been designed as whole from the beginning, so production

departments and storing places did not follow one another as the relevant process would require.

Another objective problem was that the available storing places were smaller than required and the housekeeping in them was not satisfactory.

Finally, the fact that the categories of products were totally different in relation to their shape, volume, and technical characteristics, made the shipping activities difficult and slow.

Activities that took place through the implementation of the tool

1. Internal Distribution and Handling Map

Optimum paths for internal distribution of in-process products between the wire drawing department, the galvanization lines and the welded mesh production unit were designed and documented for the current situation. This activity was carried out by the quality director, in cooperation with the supervisor of distribution and the supervisor of production planning. Additionally, the temporary storage of in-process products was determined to be carried out in the closest possible points to the next step of the process.

2. Determination of stocks of raw material

A analysis of the annual needs of all different types of wire rod (raw material) took place. The issues that had to be taken under consideration were the following:

- customer demands relevant to each type of wire rod
- respond speed of mills (suppliers)
- quality problems occurred to the wire rod due to long exposure to the open atmosphere, leading to extra cost of chemical descaling (since closed storing places for wire rod did not exist)
- financial issues related to the payment of the raw material.

It has to be mentioned that the cost of raw material was approximately 70 % of the operational cost of SME A, so it had to be the first area to address.

Finally a plan was prepared for the optimum monthly stocks of each type of wire rod and it was decided that it would be implemented for 1999. The manufacturing director invited the representatives of suppliers and presented the plan to them, to ensure that they would be able to respond to it. It is too soon to judge if they were actually able to respond.

3. Design of an improved shipping procedure

The traditional shipping practice in SME A was based on shipping quantities of different products on the same lorry, This situation had the following disadvantages:

- Shipping lasted for long, since products were collected from many different storing places and extreme care should be taken for being adjusted to avoid quality problems (mostly related to their packaging).
- Damages of products packaging did occur during transportation.
- Safety problems could occur due to the fact that products of different shapes could not be perfectly adjusted, even if they were tight, and intensive movements during transportation might have unpredictable results.

A new, improved shipping procedure was designed, based on the decision that lorries should not contain more than two (2) types of products (as in happens with containers for export shipments) and, if possible of a similar shape and volume. This arrangement had to be coordinated with the overall distribution network and customer demands of specific geographic areas should be taken under consideration. The new procedure worked to a satisfactory extent.

Difficulties and problems

The most serious difficulty was the plant layout. As it is mentioned in the paragraph of introductory elements, there were objective problems in relation to the material flow, that could be not faced.

Another difficulty relied on the fact that the staff of distribution department and mainly the clark drivers, used to work without systematic arrangements, did not show discipline in following internal distribution standard paths. The overall new situation had to be controlled very closely for being virtually established.

Results of the implementation of the tool

The results of the implementation of the LI tool in SME A became quickly obvious. More specifically:

- Internal distribution activities were impressively facilitated between the units that standard distribution paths were determined.
- The raw material inventory control activities were improved.
- The duration of shipping was dramatically reduced.
- Quality problems caused by the shipping procedure were reduced (this issue can be seen in figure 1/C, where the Pareto Analysis of causes of customer complaints of SME A for 1998 is presented).

C.1.4 Implementation of the IC tool

Introductory elements

To improve internal communication paths and to introduce systematic interdepartmental or cross-functional communication in SME A were quite difficult tasks to cope with, due to the facts that:

- the level of communication informality was very high
- roles, responsibilities and authorities, especially in the middle and the top organizational levels were not adequately clarified
- there were departments with no specific leaders (e.g. the commercial department) and the relevant employees could not feel that they really reported to somebody.

The implementation of the IC tool was accomplished mostly because a considerable number of employees could not tolerate this situation of communication that affected their work and their relationships with colleagues and considered the IC tool as a solution.

Activities that took place through the implementation of the tool

The first thing that should be done was to explain to function leaders the meaning of internal complaints. The quality director of SME prepared a simple "Internal Complaint Form" and presented it to function leaders and the director general. All function leaders agreed to the fact that employees would not be immediately in a position to report real internal complaints and they would need support.

A number of forms were completed, during a month's time, basically from the supervisor of distribution and the supervisor of production planning. The quality director started to carry out the cause analysis, but as she searched for additional data, things were found to be different from the way they were presented in the "Internal Complaint Form". She decided not to resolve these differences until the Internal Complaint Review Meeting and she presented basically these differences as the "introductory points" for the meeting.

An example of this situation had to do with an internal complaint reported by the supervisor of distribution, in relation to a hazardous equipment used for shipping bundles of steel ties for cotton baling. The problem was initially reported to the supervisor of distribution, by a worker who used it. When the quality director examined the issue she saw that all workers involved in this activity used the equipment in a wrong way and that was the reason of its hazardous performance. She used this observation as an introductory point in the first meeting.

The meeting was carried out normally but took too long. In relation to the "hazardous equipment" of the shipping procedure, workers also took part and the issue was fully analyzed. The quality director arranged a presentation of the proper use of the equipment to be carried out by the producer of it. It must be mentioned that workers were not persuaded that they used the equipment in a wrong way, but all of them attended the presentation.

During the first two (2) or three (3) meetings, practical issues had to be solved, like:

- to whom employees report internal complaints, to assure that the latter are reported to the right function leader and, in some cases, process owner
- whether the internal complaints reports were "filtered" by the function leaders while the latter completed the form and they were altered

- the duration of the meetings that had to be limited.

After about eight (8) months, the IC tool operation was more balanced, but the above mentioned issues were not fully resolved.

Difficulties and problems

There was an initial difficulty to function leaders in comprehending that problems should be reported before resulting to a non-compliance, and that in this case, prevention was the main objective.

Other difficulties had to do with the three issues mentioned above. It had to be determined whether the form would be completed by the function leader (as the IC tool describes) or it should be completed directly by the employee who initially reports the internal complaint. It was finally decided that function leaders would keep on completing the form, for enhancing the clarification of roles, responsibilities and authorities.

The duration of the meetings was a problem that was not adequately solved. Efforts were made by all participants, but the time could not be managed efficiently, since everybody took the chance to express his / her concern about issues related to his / her work and had never had an opportunity to express it before.

Results of the implementation of the tool

- Many preventive actions were undertaken. A considerable number of them had to do with safety and environmental issues.
- The implementation of the tool helped people realize roles, responsibilities and authorities, since the clarification was facilitated by the tool.
- An improvement was noticed in relation to communication informality.
- People had the opportunity to express their thoughts through a systematic way and that motivated them as well as promoted culture change.

C.1.5 Implementation of the ISCAM tool

Introductory Elements

Information related to the performance of the organization was not systematically collected and processed in SME A. Scattered information sheets were used in departments and phenomena of duplication were very common. A number of different papers referring to the same information content existed and quite often conflicts occurred.

Many times new information papers appeared in the hands of individuals that nobody could expect them to deal with the issues related to the information provided.

The thesis author, as a quality director, had established quality indicators, which were mostly exploited for the implementation of statistical techniques and the determination of preventive actions.

The director general received about five (5) different papers in a daily basis, to get an overall idea of the performance of the organization and as he said, he actually needed additional information.

Activities that took place through the implementation of the tool

1. Information Flow Analysis

A list was made of all the existing formal sheets and of the information reported through them. There were the following:

1. Daily product sheet
2. Daily productivity sheet
3. Drawing machines speeds sheet
4. Zinc consumption sheet
5. Raw material consumption sheet
6. Sheet of confirmed orders of exports
7. Sheet of shipments and orders
8. Customer complaint sheet
9. Cash flow sheet
10. Non-conforming product sheet
11. Quality Control Lab daily report sheet
12. Employee allocation sheet

The director general received the sheets referred in the above points 2,6,7, 9 and 12 in a daily basis.

The sheets were grouped to five (5) "cells" of information:

- information related to sales
- information related to production
- information related to quality
- information related to employees.

2. Selection of ISCAM focal points

For each one of the above mentioned cells of information, the individual that produced or processed the information was selected to be an ISCAM focal point. The quality director explained to these individuals that they would be responsible for the accuracy and the adequacy of the information of the relevant cell.

3. Determination of Quantitative and Qualitative Indicators

Indicators that were already established for the implementation of the quality management system were selected. These indicators were:

- number of customer complains in relevance to the sales volumes (related to the Customer Complaints Index)
- recall volumes (%)
- quantities of non-conforming products in relevance to the total quantity produced (%)
- productivity

It was determined that indicators for safety and environmental issues would be progressively identified together with other additional indicators for the overall performance of the organization.

4. Modification of the Form of Information Flowing through focal points

Modification took place in terms of changing some of the forms of the sheets used, to achieve compatibility. There were also some sheets that they would no more needed to be completed.

5. Transformation of Outputs

The transformation of outputs was based on the information provided and on the information needs of the director general. He gave his input and the "Daily ISCAM Data Sheet for Top Management" was developed (see figure 4/C).

For carrying this modification, due the fact that specific financial data was required, the quality director cooperated with the financial department of the organization. Since the director general wanted to be informed about the financial issues of investments related to quality, safety and environment, the relevant data should be excluded and monitored. It was decided that, progressively, this data would be linked to any other financial data related to the operation and the quality management system and whatever else would be integrated to it.

The Daily ISCAM Data Sheet for Top Management was initially prepared by the quality director. Very soon an employee of the Quality department was trained and was in a position to prepare it.

Difficulties and Problems

It was very critical for the implementation of the tool the correct choice of the focal points. Nobody was willing to become a focal point due to the fact that they did not want to be responsible for the information they managed. So it was important to be persuaded that this situation was a part if their existing work and nothing was added, so the should not have objections.

Another serious issue was that of the modification of sheets. An effort was made to reduce the number of sheets and to fully avoid duplication. This issue could not be easily achieved due to the fact that no unique computerised system was implemented in the organization.

Results of the implementation of the tool

The most significant results of the implementation of the tool were the following:

- People became more responsible for the information they managed, so they started to control it. By this way the reliability of the overall information flow system of the organization was increased.
- The director general was actually facilitated in his daily activities and also was enabled to quickly respond to problems. The sheet that was created included items that would be included in the near future, for completing the overall performance assessment of the organization.
- A dynamic assessment mechanism was initiated that would be extended to be the unique information and assessment framework of the organization.

C.2 Implementation of the particular tools of the IMS route-map to SME C

C.2.1 Implementation of the MI tool

Introductory elements

Due to the fact that SME C performs its activities in a very competitive environment, marketing activities have to be focused and this necessity has been recognized by the owners of the organization.

The organization aims mostly at achieving turnover objectives rather than improving the rate of customer satisfaction and in this point, a need of mentality change is identified. This view is reinforced by the fact that the organization provides services in the area of beauty and fitness and customer satisfaction is much more critical than price.

SME C does not have a marketing department. Any marketing activities are carried out by the owners and by the general manager.

Activities that took place through the implementation of the tool

The thesis author cooperated with the owners and the general manager of the SME C and a limited number of activities related to those proposed by the MI tool were initiated, which are outlined below.

Internal marketing activities

- **Review of the customer requirements, needs and expectations**

A detailed review of the customer requirements, needs and expectations was carried out by the owners, the general manager and the sales managers of the organization. The thesis author attended the relevant meeting.

During this review, emphasis was put on the fact that the customer expectations from the services provided by the SME C are mostly related to psychological parameters and less to physical ones. Customers go to the fitness studio because they want to feel better and this can be achieved by two (2) ways:

- a. the physical results of the treatments
- b. the psychological support they have from the staff of the studio.

It was obvious that the organization did not focus point b as required. It was determined that a new approach should be adopted, based on the fact that services should start from the psychology of the customer and should be focused on that during

the whole treatment program. Consequently, a fully tailored communication mechanism would take place with each one of the customers.

The general manager proposed this new thinking of customer expectations to be exploited in the marketplace and the owners agreed with her proposal.

External marketing activities

1. Communication with customers (including lost ones)

A simple newsletter was determined to be issued and sent to customers, including the lost ones, presenting new therapies and treatments carried out by the organization, new cosmetics used in treatments and new fitness equipment available. In this newsletter, any other information relative to the overall activities of the organization would be included.

2. Provision of free-of-charge advice to children having weight problems

This activity is related to the enhancement of the relationship between the organization and the society. Specific staff of the organization would provide advice to children having weight problems and support them in their efforts of losing weight.

Difficulties and problems

Specific difficulties were not identified in relation to the implementation of the activities presented above.

Results of the implementation of the tool

The implementation of the MI tool in SME C is limited and can be considered as a pilot. However, the following positive results were reported by the owners of the organization:

- A new marketing orientation emerged from reviewing the requirements, expectations and needs of customers. This orientation could become a competitive advantage of the organization in the near future.
- A percentage of about 20 % of lost customers telephoned to the organization as soon as they took the newsletter and a new cycle of communication started.
- The owners received positive comments about their arrangement for free-of-charge services to children having weight problems. It should be mentioned that the organization hardly affords activities like that but it was considered as a medium-term investment to society and potential customers.

C.2.2 Implementation of the QSE tool

Introductory elements

SME C performs processes that are exclusively linked with the particular services provided. It can be said that each process is a service. Distinct locations do not have significant differences because all of them are rooms and issues that make some of them differ from others may be a particular installation that exists (e.g. bathrooms) or a facility related to the process that is carried out in a room (e.g. rooms specially air-conditioned, where aerobics exercising programs take place).

The selected process is:

- the face cleaning process (P1)

The selected distinct locations were:

- bathroom (I1)
- beauty treatment cabin (I2)

Activities that took place through the implementation of the tool

Phase A – Definitions

In this phase, the processes and distinct locations were defined.

The face cleaning process (P1) was defined as follows:

Step 1: Makeup is removed from the face by the beautician

Step 2: Beautician prepares the skin for the cleaning process through massaging it with a special lotion

Step 3: The cleaning activity is carried out by the beautician with the use of a special equipment operating with electric current

Step 4: Beautician puts an emulsion to the face with a cotton pad.

Bathroom (I1) was defined as a place where the customer enters to have a shower or a bath before or after the treatment.

Beauty treatment cabin (I2) was defined as the area where the customer enters to be treated by the beautician (e.g. body massage cabin).

Phase B – Identification and linking of elements

Process P1

All steps of process P1 are linked with the quality parameter, since the beautician is in contact with the customer and the latter has the opportunity to feel the quality of the

service provided. Additionally, the cosmetics used determine the final results of the treatment.

Steps 1,2 and 4 of process P1 are linked with the environmental parameter, since the cosmetics used are in plastic bottles and their deposit has an environmental impact.

Step 3 of process P1 is linked with the safety parameter, since the special equipment used operates with electric current and any non-conformance in its operation (due to a problem of the equipment or to a human error) may have an affect to the beautician and / or the customer.

Location I1

Location I1 is linked with the quality parameter, since the conditions inside a bathroom determine the quality of the service provided (e.g. cleanness, correct temperature, other relevant facilities). It is linked with the environmental parameter, since soaps, foams and other relevant materials used are affecting water in waste pipes. It is linked also with the safety parameter, since if ergonomics are not proper, accidents may occur.

Location I2

Location I2 is linked with the quality parameter, since conditions inside the cabin determine the quality of the service provided (e.g. housekeeping, correct temperature, cleanness). It is linked also with the safety parameter, since if ergonomics are not proper, accidents may occur.

Phase C – Relative Significance of Elements

Figure 3/C illustrates the relative significance (%) of the IMS elements for the selected process and locations. The determination of the relative significance of the IMS elements was based on the criteria set by the tool (see 3.2.2) but it was mostly qualitative, due to the fact that a fully detailed analysis could not be carried out during that period of time. The determination of the relative significance was carried out by the thesis author, in cooperation with the treatments supervisor.

Phase D – Cause Analysis

Cause analysis was based on the following categories of dependence on the elements of the IMS:

- dependence resulted from equipment / “Function e”
- dependence resulted from materials / “Function m”
- dependence resulted from the human parameter / “Function h”
- dependence resulted from ergonomics / “Function r”
- dependence resulted from internal conditions / “Function c”

Cause analysis gave the following results:

P1: e(Q,S), m(Q,E) h(Q,S) which means that for the process P1, safety points of concern are related to the equipment used and to the human parameter, environmental points of concern are related to the materials and the quality points of concern are related to the equipment used, to the materials and to human parameter.

I1: m(E), h(Q), r(S), c(Q) which means that for location I1, safety points of concern are related to the ergonomics, environmental points of concern are related to materials and the quality points of concern are related to the human parameter and to internal conditions.

I2: r(S), c(Q), which means that for location I2, safety points of concern are related to the ergonomics and the quality points of concern are related to internal conditions.

These functions could be furthermore analyzed but during that period of time the relevant personnel of SME C were not available.

Phase E – Action Planning

For P1, the following action plan was prepared:

- A detailed technical examination should be carried out for assuring the suitability of the face cleaning equipment.
- A training program to clark drivers, emphasizing on quality and safety issues would be carried out (priority 2).

For P2, the following action plan was prepared:

- All beauticians would be trained in the area of customer servicing (priority 1)
- The process was very critical in relation to all parameters and through all functions, so it should be assigned to a specific process owner (priority 2).
- The organization would seek for a company to cooperate for plastic bottles recycling (priority 3).

For location I1, the following action was determined:

- Inspections would be daily carried out by the treatment supervisor for controlling the internal conditions of bathrooms (priority 1).
- A system of automatically controlled air conditioning would be purchased and installed (priority 2).

For location I2, the following action plan was prepared:

- Inspections would be daily carried out by the treatment supervisor for controlling the internal conditions of the cabins (priority 1).

Action plans were approved by the owner of SME C.

Difficulties and problems

It was difficult for the personnel of SME C to start thinking of the services provided in terms of processes. The implementation of the tool in SME C is considered as a pilot implementation indicating the actual operation of the tool. He selected processes and locations.

Results of the implementation of the tool

It is obvious that the QSE tool worked, even through its pilot approach. Action plans were prepared, but the most important result of the implementation of the tool was that people in SME started to consider services as processes and to understand that not only the parameter of quality, but the parameters of safety and environment are related to their activities as well.

FIGURE 1/C
SME A - Customer Complaints -1998
(Pareto Analysis)

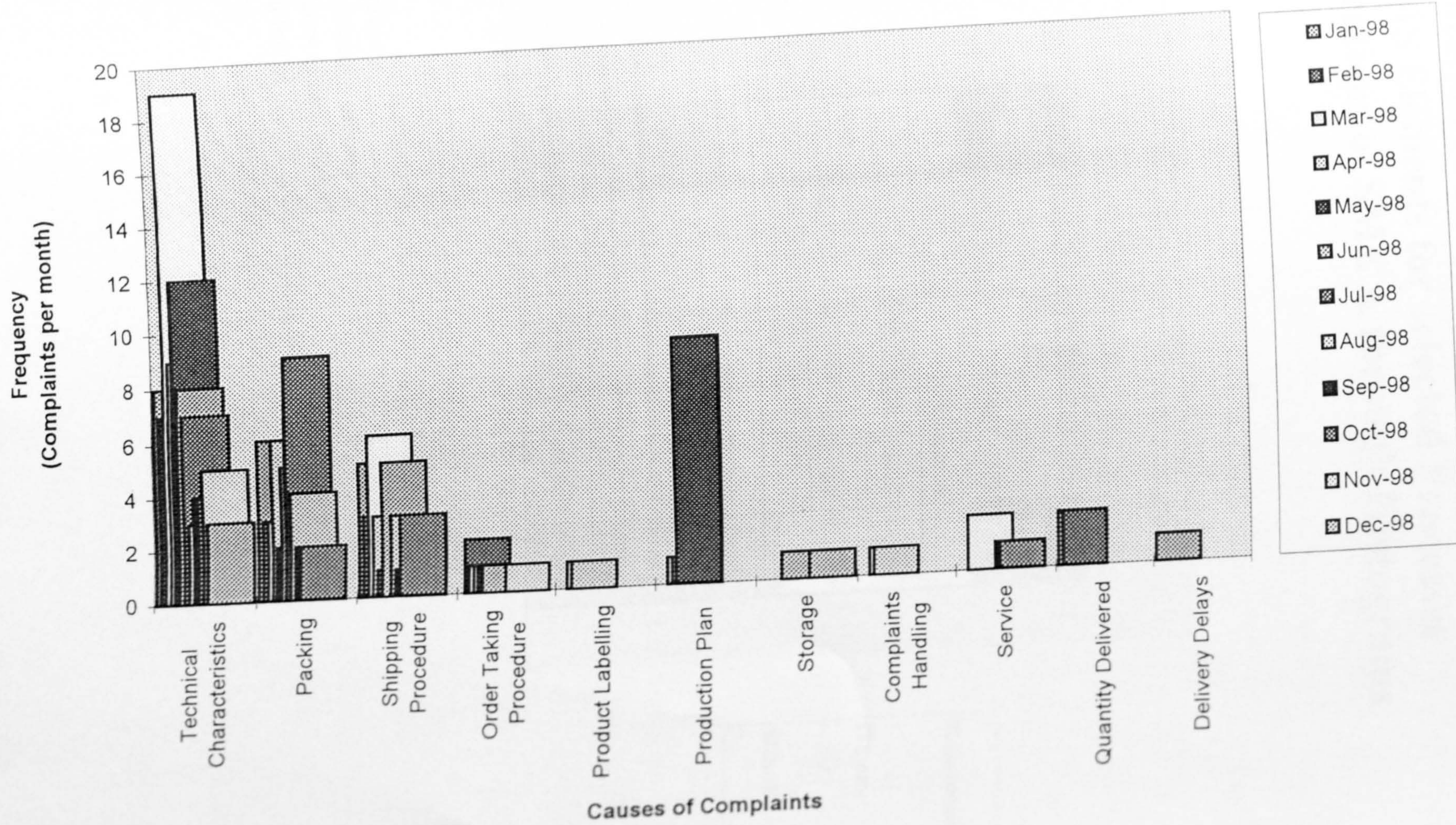
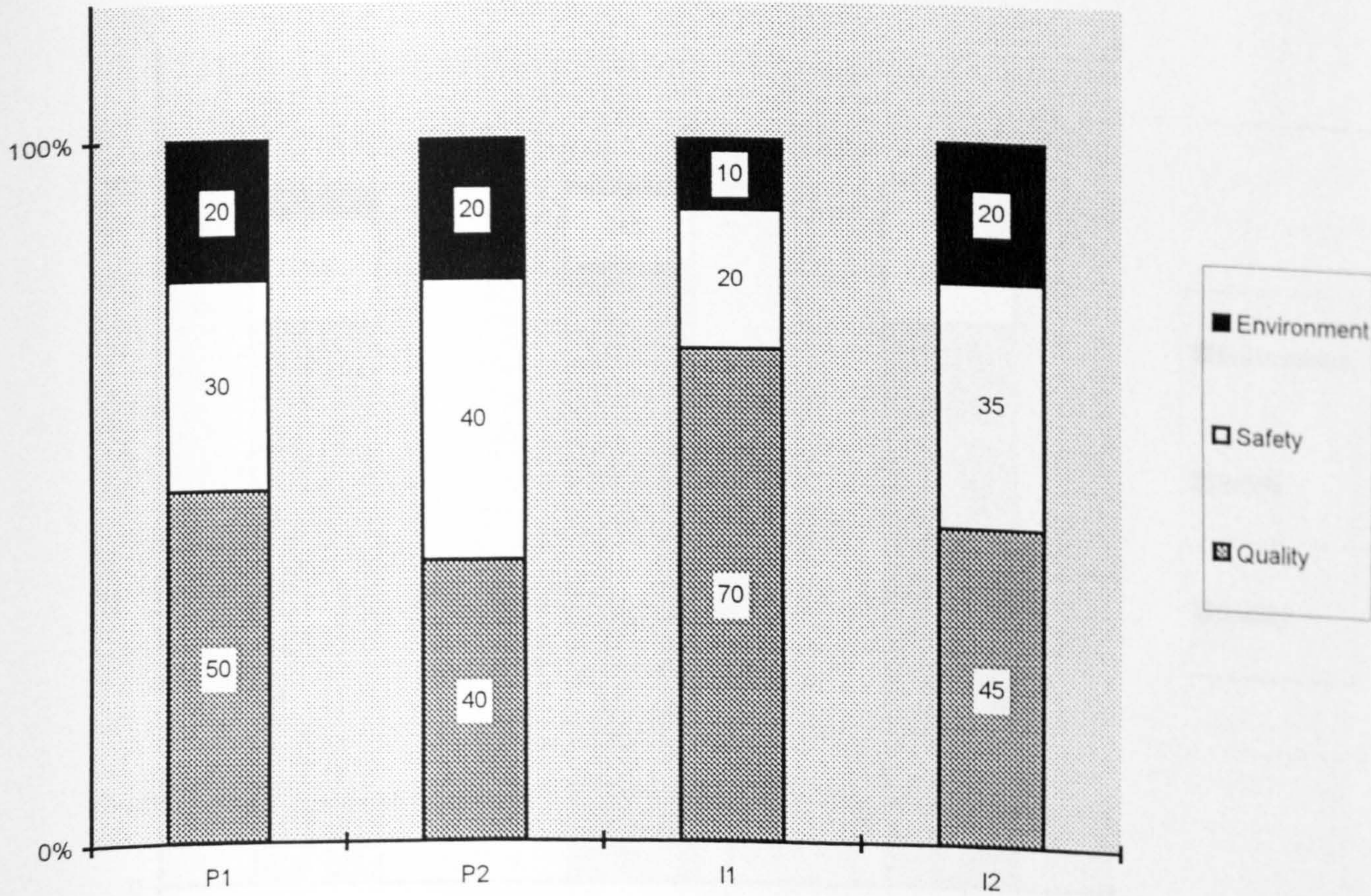


FIGURE 2/C

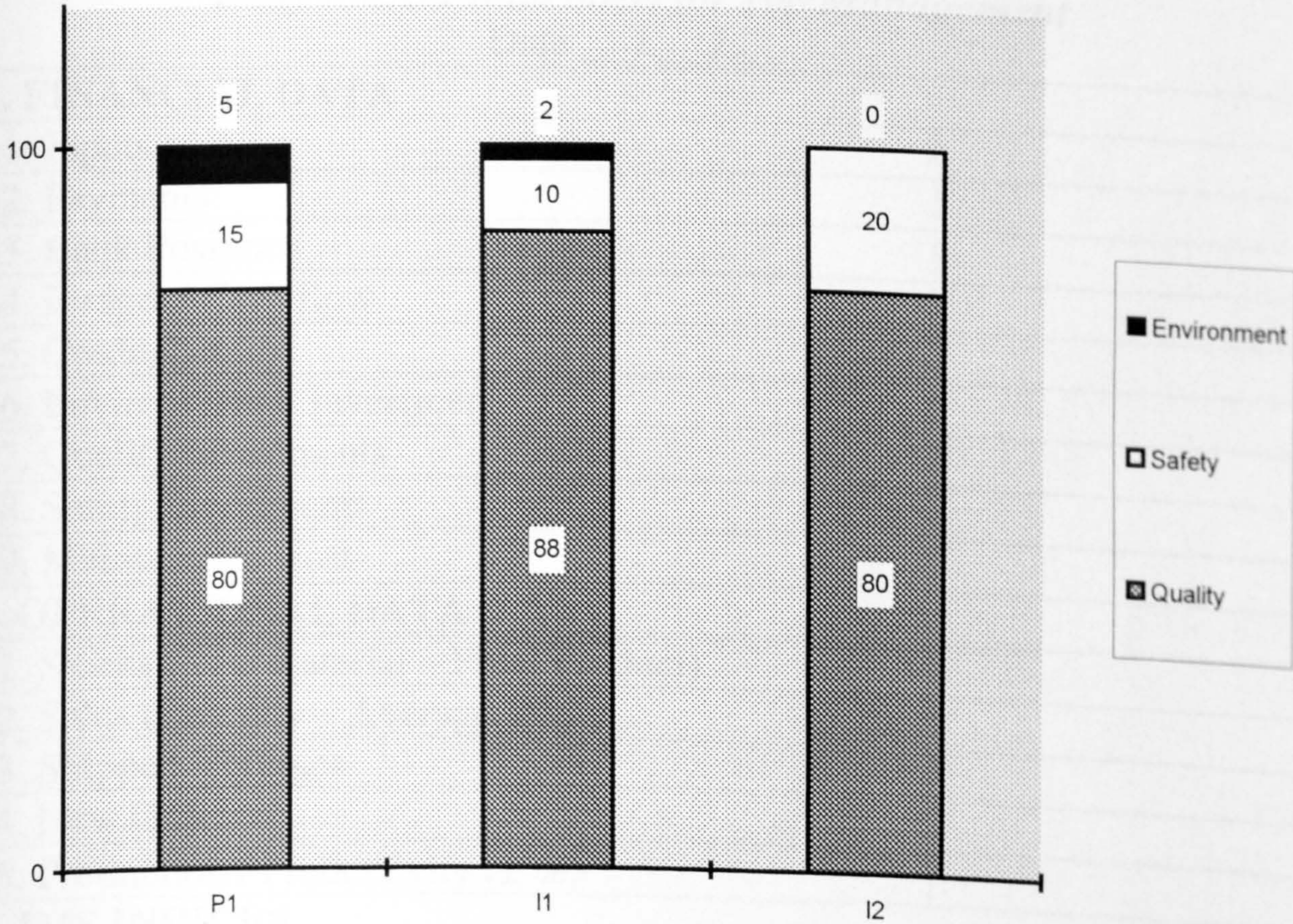
**Presentation of Relative Significance (%)
of IMS Elements for selected Processes
and Locations of SME A through Histograms**



- P1: Shipping process
- P2: Wire galvanization process
- I1: Storing places of final product
- I2: Production line of copper coated welding wire

FIGURE 3/C

**Presentation of Relative Significance (%)
of IMS Elements for selected Processes
and Locations of SME C through Histograms**



P1: The face cleaning process
I1: Bathrooms
I2: Beauty treatment cabins

FIGURE 4/C

Daily ISCAM Data Sheet for Top Management of SME A

SME A	
<i>Daily ISCAM Data Sheet for Top Management</i>	
Date __ / __ / __	
A. FINANCIAL DATA	
A1. Inputs	
A2. Payments	
A3. Bank Positions	
A4. Budget / Cash flow	
A5. Credit Control	
A6. Environmental Investments	
A7. Quality Investments	
A8. Safety Investments	
A9. Maintenance Cost	
B. OPERATIONAL DATA	
B1. Stocks (Raw material – Final Product)	
B2. Sales (Quantity – Average Price)	
B3. Shipped Volumes	
B4. New Orders	
B5. Production / Productivity (\pm %)	
C. IMS INDICES	
C1. Non-conforming Products (%)	
C2. Customer Complaints Index	
C3. Recall Volumes (%)	
C4. Loss Index	
C5. Environmental Non-Compliance	
D. PEOPLE	
D1. Allocation Normality	
D2. (%) Presence	