22 AN EVALUATION OF THE EFFICIENCY OF QUALITY MANAGEMENT SYSTEMS IMPLEMENTED IN SMALL ENTERPRISES – RESERACH RESULTS

22.1 Introduction

A wide interest in quality management systems goes back to the 1990s. Although it did not mark the beginning of a road to quality, the edition of 9000 ISO standards in 1987 was a breakthrough in a pro-quality approach in many enterprises, not only in Poland. The issue of quality standards by the international organisation ISO at the end of the 20th century is a result of nearly one hundred years' works connected with the development of a quality approach. Details concerning the evolution of the quality approach can be found in the rich subject literature [1, 2, 3].

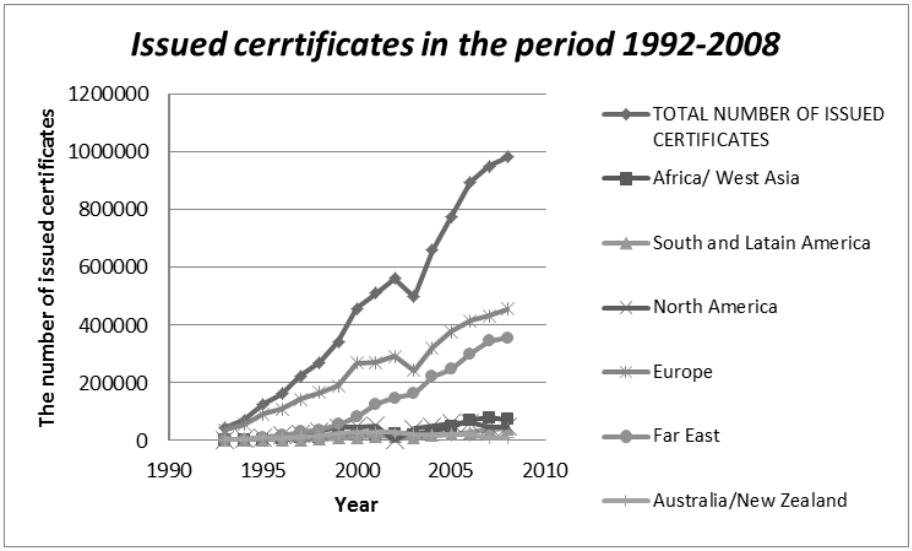

Fig. 22.1 The number of issued certificates confirming the compliance with ISO 9001 standard in the years 1992-2009
Source: Own study on the basis of [19]

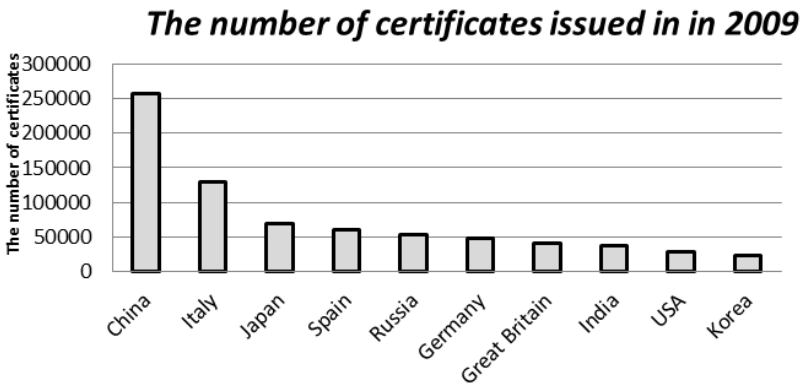

Fig. 22.2 The number of certificates issued in particular countries in 2009
Source: Own study on the basis of [18]

Although different opinions are expressed about quality management systems, we can still observe an increase in the number of issued certificates confirming the compliance of quality systems with ISO 9001 standard. The tendencies in this area on a global scale have been illustrated in fig. 22.1- fig. 22.3.

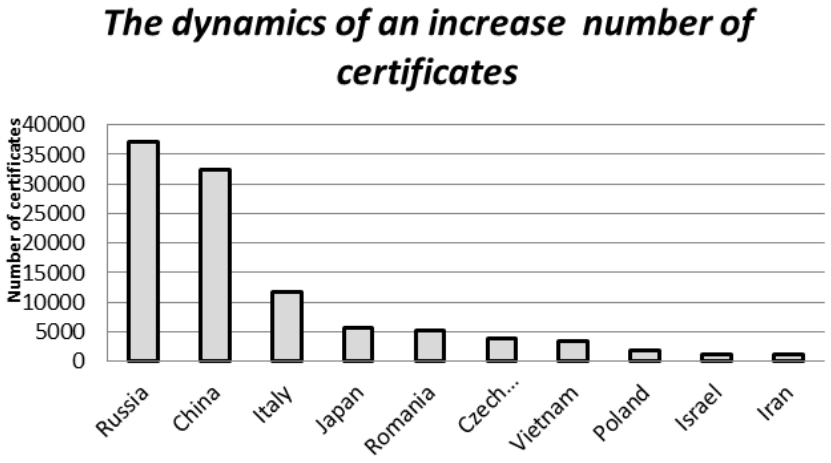

Fig. 22.3 The dynamics of an increase in the number of certificates in particular countries Source: own study on the basis of [19]

22.1.1 The effectiveness of quality management systems

The presented statistics show an optimistic side of an increased interest in quality systems as a tool to support the management of a company. We may also observe opinions on little usefulness of quality systems in management [4, 5, 6]. The reasons of little effectiveness of quality management systems are shown in the author's studies conducted in 20 small enterprises in Silesia [7]. The presented research results indicate that such a condition is caused by a few factors, namely personality features of the management staff, improper preparation of employees for using QMS to improve processes and internal auditors' insufficient skills in the identification of non-conformities and areas to be improved. Attention has also been paid to the lack of formal preparation of consulting companies staff preparing the companies for quality system certification [8]. Problems regarding the quality of counselling services is the subject of research presented in this work [9].

In his studies M. Ligarski [10] draws attention to the causes of difficulties and problems in organisations implementing quality management systems. He includes in them a human factor, which is the reason for mistakes – they concern chiefly the sphere of decision taking and negligence's, being the causes of omissions. When investigating the reasons for the lack of efficiency in the introduction of changes J. Kowalick [11] uses the term "psychological inertia", which he defines as a kind of psychological difficulty in introducing the changes. In his opinion, this feature constitutes a considerable barrier to the solving problems ability and creativity. Communication barriers, failure to understand the idea of Quality Management System as well as the lack of trainings or failure to appreciate them frequently result in resignation from maintaining a certified QMS as a tool which does not bring tangible benefits to the company [13].

Quality management systems also limit the risk related to the activity a company is engaged in. The importance of risk in business activity is highlighted in the works on another amendment of ISO 9001 standard. In announcements concerning the works on this standard amendment the analysis of risk is quoted as one of the areas which will require a system regulation. In the currently binding ISO 9001 standard there is no direct requirement regarding risk analysis, but a reference to risk appears indirectly in a few standard requirements.

Requirements connected with risk in these areas can be found in such points of the standard as:

5.4 Quality planning,
5.6 Management review,
7.1 Planning of product implementation,
7.3 Design and development,
8.2.2 Internal audit,
8.5.2 Corrective measures,
8.5.3 Preventive measures.

Proposals concerning the amendment take into consideration the adoption of a line of thinking in risk terms in relation to:

- The provision of products which meet the customer's requirements as well as legal and other requirements,
- Strengthening the process approach, which is aimed at securing an organisation against risk related to process capability decrease.
- Improving the management system effectiveness in the achievement of goals as well as analysis of internal and external factors influencing the efficiency and effectiveness of management [13]

Risk as one of the main subjects of the amendment is listed together with other areas to be regulated anew in a big amendment of the standard planned for the year 2015. First signals of the new approach can be found in the amended ISO 9004 standard as of 2009 Management aimed at achieving an organisation's lasting success. – Approach through quality management. The introduction of a reference to risk in ISO 9001 standard is a loop ensuring the consistency of this standard with specialist standards such as ISO/TS 16949 Quality Management Systems – Detailed requirements for the application of ISO 9001:2000 in the automotive industry in serial production and the production of spare parts, or ISO 13485 – Medical Products – Quality Management Systems Requirements.

An internal audit helps to minimize risk and ensures continuous effectiveness of the system. When verifying the documentation during third party's audits it frequently happens that nonconformities are not reported in the post-audit documentation. Investigations conducted by K. Midor to establish the role of audits in QMS showed that the least importance is attached by respondents to risk resulting from the failure to meet the requirements and the detection of wastage and unnecessary costs [14]. Such an approach to audits may result from two reasons. Namely, the documentation of quality systems is most frequently constructed by consulting firms on the basis of a model which was proper for ISO 9001-3 standards from

the year 1994, in which nearly every requirement started with an obligation to work out a documented procedure. This line of thinking is applied in most systems based on the requirements of ISO 9001 standard as of 2008. Therefore, documentation is not prepared in the process approach, but it is a copy of the standard's table of contents. This is favoured by ISO/TR 10013 standard Directives regarding quality management system documentation as of 2001, which mentions the structure of documents but does not say much about the manner of documenting the processes understood as a sequence of activities transforming the input data into process goals while taking into consideration the added value that should accompany the component activities of a process. Due to such an approach to documentation, it contains a lot of information which makes its practical use difficult. It neglects the description of processes and standard procedures. The most frequent reasons why QMS documentation is treated like a useless burden for users include the following [15, 16]:

- Errors in the description of processes resulting from the application of outdated procedures and instructions, which were developed many years before; they describe activities that no longer exist – this most frequently results from a change in technology, infrastructure, requirements,
- Procedures may contain a requirement to produce paper copies or records and store them in files, although an it system of data storage and analysis has been implemented,
- Accumulation of temporary solutions introduced into the procedures in qms documentation e.g. As a result of nonconformities found during third party's audits,
- Repeating the same information in many documents, most frequently caused by the fact that procedures were created by many authors,
- The opinion of qms procedures' authors that placing the same information in various documents favours an effective supervision of processes,
- The same requirements and specifications are accidentally contained in various documents, they may be placed in drawings, control plans, control lists, control sheets, orders,
- If the procedures are not written in the convention of a flow, there are many repetitions in the procedures content – many authors do not take into account what the employees do, instead they copy the requirements of the standard – such procedures resemble the standard rather than work instructions and in consequence become incomprehensible for the employee,
- The same written requirements may be written in different forms; some people prefer text procedures, block diagrams, instructions or databases,
- Continuous improvement of qms effectiveness, which is often carried out by extending the system documentation through an addition of new tasks, paragraphs or new working instructions to the existing documents; there is an opinion that corrective measures must be accompanied by additional documents,
- Documents which are not used in practice are left in qms documentation „just in case",

- A recommended form of qms documentation are directives contained in iso/tr 10013 standard directives regarding a quality management system. The proposed format of procedures encourages the introduction of repetitions or activities which do not bring an added value to the process; before being approved for application, the documentation is not reviewed as a whole, but only as a single document,
- Although 11 years have passed since the time of introducing the „big amendment" of iso 9001 standard, many organisations apply numerous procedures that were required by the provisions of iso 9001-3 standard as of 1994 – there is a conviction that each element of this standard is a process – such an approach results in many repetitions in qms documentation,
- Some authors treat qms documentation as a tool to force the management to take measures which are difficult to exercise – this is seldom connected with an added value, which should be present in a process,
- Many authors, auditors and management representatives overinterpret the requirements contained in a standard, which results in the system documentation extension,
- Extended documentation also results from the fear that a third party's auditor may prove the lack of a document as nonconformity,
- Some third party's auditors require a vast QMS documentation.

Quality procedures that describe standards of procedures should be simple and practical in use so that they can be applied in a daily workshop practice. When developing quality standards for a system, one should follow not only the requirements directly listed in the standard, but also take into account a number of requirements defined in other sources. An example has been given in fig. 22.4 .

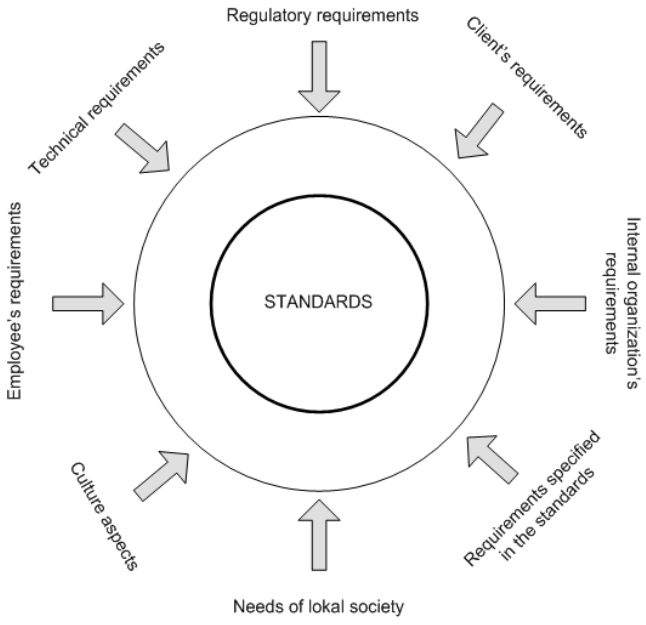

Fig. 22.4 Factors to be taken into consideration when developing the standards
Source: Own study

The second cause of the little effectiveness of internal audits as an improvement tool is insufficient training of auditors and paying attention solely to the formal fulfilment of the standard requirements, without using one of the simplest tools, which plays both an order-restoring and educational role, which is e.g. the 5S method. Fig. 22.5 shows photographs taken during one of the third party's audits in a company whose quality system has been functioning for more than 10 years, while the internal audits did not show any nonconformities. Therefore, effective functioning of management systems based both on ISO 9000 standard and the "lean engineering" philosophy depends on the rational building of a system documentation. The role of an audit in a mature quality system also involves examining the documentation with regard to its usefulness and cohesion as well as changing the employees' attitudes.

a) b)

Fig. 22.5 Photographs taken during a third party's audit:
a) an electrician's workstation,
b) „supervision" over control-measuring equipment during an audit in a warehouse
Source: the author's photographs

22.2 Own research

22.2.1 Aim and scope of research

The aim of the research was to evaluate the effectiveness of QMS in small companies. The research covered 12 selected enterprises having an established quality management system. Investigations were carried out in two stages. The first stage included self-assessment of an enterprise, the aim of which was to evaluate how the company's management staff perceived its strategy, process approach, QMS documentation, information from the audit and how internal information originating from QMS was used.

In the second stage was conducted an audit the aim of which was to confront the declarations contained in the self-assessment sheet with the real practices applied in the organisation as well as to examine the personality features of the management staff within the scope of skills related to the introducing of changes, communication and teaching the others. The communication test analysed the general ability to communicate. Questions contained statements concerning the communication errors containing verbal and non-verbal misunderstandings, as well as the principles of verbal communication, the ways of expressing thoughts, feelings and transmitting the information. Investigations into personality features were con-

ducted on a population of the management staff of the examined organisations. In the studies standard test forms were used [17].

22.2.2 Research results

In the research it was assumed that QMSs based on ISO 9001 are systems which are first codified management systems in the organisations. The studies were conducted in production and services providing enterprises classified as small firms (employing <50 people) according to the classification contained in the Freedom of Business Activity Act. In the examined population there were 12 small enterprises employing 10 to 36 workers. All of the enterprises subjected to research benefited from financial support (within the framework of governmental pre-accession or structural aid) when implementing and certifying the quality system. The use of financial supportinvolved the necessity of using the aid provided by consulting firms accredited by PARP (Polish Agency for Enterprise Development).

The representative of the highest level management received a questionnaire which contained questions regarding the following issues:

- Data concerning the quality system implementation methodology,
- Company's strategy expressed in a quality policy,
- Relating the strategic goals with the goals on a tactical and operational level,
- The use of statistical methods and tools in an analysis of information from QMS,
- The use of data from Management Review for taking business decisions.
- The use of QMS documentation in the implementation of production/services provision processes.

To each of the self-assessment sheet questions the respondents could give one of five evaluations:

- The lack of evidence that the relevant area was regulated in QMS.
- The evidence does exist, but it has not been introduced to QMS.
- The evidence does exist but the regulation is being introduced at the moment.
- Partially implemented.
- The evidence has been fully introduced.

The research results have been given in tab. 22.1.

Tab. 22.1 The results of personality tests conducted on a population of 30 members of organisation C
Source: own study

Tested group	Communication skill	Skill of teaching the others	Ability to communicate	Ability to introduce changes
A	62,17 (BW)	53,74 (P)	56,98 (W)	59,00 (P)
B	56,37 (N)	54,84 (N)	50,38 (N)	55,16 (N)

22.2.3 Evaluation of QMS on the basis of an external third party's audit

Investigations in a form of an audit covered selected areas of QMS which overlapped with the areas used for self-assessment. The auditor looked for objective evidence of the fulfilment of particular areas and he provided the collected proofs with commentaries in a form of notes, which allowed to evaluate the implementation effectiveness.

22.2.4 Research into personality features of the management board members and managerial staff in the examined enterprises

Investigations were conducted by means of standard tests allowing to assess personality features of the examined respondents. In the studies the communication test, the test of teaching the others to communicate as well as the test of introducing changes were used.

Tab. 22.2 The results of self-assessment of QMS in investigated enterprises Source: own study

Question	**1***	**2**	**3**	**4**	**5**
Does the quality policy contain a set of values and strategic goals which translate into a tactical and operational level?					12
Are the goals measurable?					12
Has the company management board undergone a training within the scope of process management and customer-oriented approach?			7	2	3
Have indicators being a measure of business results of an enterprise been specified?					12
Are meetings systematically planned?					12
Does the enterprise management board participate in meetings concerning the analysis?			9		3
Is the stored and analysed data specified?			8		4
Are quality improvement tools or statistical methods used to analyse data?	9	2			1
Have the measures of effectiveness been specified for:					
Financial results					12
Operational processes			10		2
Customer's satisfaction					12
Employee's satisfaction		12			
Is the data systematically stored, analysed and presented in a graphic form?			2		10
Are manufacturing processes systematically planned?					12
Has the capability of manufacturing processes in an organisation been analysed?				10	2
Have measures and standards of requirements for suppliers been specified?					12
Is analysis conducted in the event of nonconformities and are corrective measures taken?					12

Tab. 22.3 The results of an audit of selected QMS areas in the investigated enterprises Source: own study

Question	Bad	Satisfacto-ry	Good	Very good	Excellent
How do you assess cooperation with the consultant ?			8	4	

****) values given in the table correspond to the evaluation according to principles quoted in the article text***

Tab. 22.4 The results of an audit of selected QMS areas in the investigated enterprises Source: own study

Question	1*	2	3	4	5
Does the quality policy contain a set of values and strategic goals which translate into a tactical and operational level?		4		8	
Are the goals measurable?			8	4	
Has the company management board undergone a training within the scope of process management and customer-oriented approach?	8			4	
Have indicators being a measure of business results of an enterprise been specified?			10	2	
Are meetings systematically planned?		6	4	2	
Does the enterprise management board participate in meetings concerning the analysis?	7			2	3
Is the stored and analysed data specified?	12				
Are quality improvement tools or statistical methods used to analyse data?	12				
Have the measures of effectiveness been specified for:					
Financial results		12			
Operational processes	10				2
Customer's satisfaction	8			4	
Employee's satisfaction	12				
Is the data systematically stored, analysed and presented in a graphic form?	12				
Are manufacturing processes systematically planned?		10			2
Has the capability of manufacturing processes in an organisation been analysed?	12				
Have measures and standards of requirements for suppliers been specified?			12		
Is analysis conducted in the event of nonconformities and are corrective measures taken?			9		3

The research covered 8 people belonging to the highest level management (group A) and 20 lower level managers (group B). The research results have been given in tab. 22.4. In brackets was given the assessment of the obtained result according to [17], where (BW) means very

high predispositions, (W) high predispositions, (P) average predispositions, while (N) – low predispositions.

22.3 Research results analysis

The research was conducted in order to evaluate the effectiveness of mature QMSs implemented in enterprises classified as small companies, as a tool supporting the organisation management. The results were obtained on the basis of a self-assessment form filled in by the highest level management representatives, including owners (17% of the respondents) and QMS representatives (83%). The data quoted in Table 1 indicates that in the enterprises subjected to research the level of QMS assessed by decision taking persons is high. Within the framework of QMS improvement an increased engagement of the company's management board in the process approach should be considered. This refers in particular to the analysis of broadly understood processes as well as information obtained this way. The use of basic statistical tools to analyse figures will increase the effectiveness of decisions regarding the improvement of a company management system. This evaluation was expressed by persons responsible for the quality system in a company. Low assessments of the respondents were given to the application of basic quality improvement tools known as 7 old improvement tools.

In the opinion of the respondents the highest evaluated areas of the system was the quality policy containing values as well as strategic goals. In the respondents' opinion the goals expressed in the quality policy are directly linked to the tactical level of management and operational aims. They are also assessed as measurable goals.

A certain difference in the respondents' opinions was noted for trainings of the company's management. The opinions indicate that the problem of trainings is at the implementation stage (7 cases), while in 5 cases the management has been partly or fully trained within the scope of QMS principles. According to the requirements of ISO 9001 standard, the company management's engagement involves taking part in meetings referred to as "management review" in the system terminology. This area needs improvement. The research revealed that the management's participation in "management reviews" or quality trainings is small. Participation in these meetings as well as systematic storage and analysis of data were evaluated as the implementation stage. The questionnaire also shows that basic statistical tools are not used to analyse the data, although measures and indicators of effectiveness for financial results and operational processes of customer satisfaction survey were determined. The declarations suggest that this data is presented in a graphic form in documentation.

Attention was also focussed on the systematic planning of manufacturing processes, the capabilities of which are the subject of analysis. Full implementation of QMS is declared by all the examined companies within the scope of determining the measures and standards applying to suppliers as well as the source analysis of reasons for conformities.

The areas contained in the questionnaire were subjected to analysis. The aim of the audit was to confirm – by analysing the source documents and records, observations and conversations – the extent of using the areas in the company's quality management.

A document containing a company's quality strategy is the policy of quality. Paragraph 5.3 of ISO 9001 standard contains a provision requiring the quality policy to be adjusted

to the goal of an organisation, obliging an organisation to fulfil the requirements and undertake continuous improvement as well as to create a framework for establishing and reviewing the quality goals and to review the policy with regard to its continuous usefulness. The quality policies presented by the examined companies usually fulfil these requirements. In 4 analysed cases the policy had such a generally formulated message that it could be used in any organisation. In all the examined documents the most important attribute of this document was omitted – the standardised vocabulary clearly states that a quality policy is "an entirety of aims and orientation of an organisation expressed by the highest level management". Therefore, the most important element is not "the obligation to fulfil the requirements", which should be a summary of the strategy expressed in a policy, but determination of the company's strategy and relating the aims to this strategy on a tactical and operational level (for particular functions and levels – paragraph 5.4.1 of ISO 9001 standard). A quality policy is related to the requirement of planned management reviews. In general provisions (5.6.1) it is emphasised that a review should be carried out in planned time intervals and should cover the possibility of improvement, including the quality policy and quality aims. A quality policy was taken into account in management reviews in all the examined enterprises as an element for discussion, but its content was not changed in 11 enterprises during a period of 3 to 7 years. It is then hard to adopt a thesis that the system is functioning correctly if the strategy does not take into consideration the changing environment and the changes in an organisation seen as a system are analysed once a year, most frequently immediately before a visit of a third party's auditor. Also the management's engagement in management reviews raises doubts. In practice they are reports, which are seldom supported by analysis. This is proved by the dates of reports preparation. These reports make an impression of having been prepared hastily, without analysis of the phenomena. A problem might be an improperly adopted set of measures of processes effectiveness defined as necessary in an enterprise. Among the measures giving a picture of the effectiveness of operational and management processes there are ones which undoubtedly have a practical value. They include the degree of acquaintance with the policy measured by a percentage of employees who know the quality policy of the enterprise, deliveries ordered without a detailed specification evaluated on the basis of a percentage of deliveries without a determined specification or the correctness of filling the posts - % of employees holding positions in a given unit positively assessed in relation to all the employees. Among the measures we can seldom find the number of complaints, the time of machines use, the rotation of stocks or the use of available working time.

There is an established procedure of the manner of evaluating the customer satisfaction survey and assessing the suppliers. However, the way the effectiveness of these processes is evaluated raises doubts. Customer perception is assessed in all the analysed cases on the basis of survey research results. The survey's response rate is low, and the sent questionnaires contain methodological errors. A typical example is the use of suggesting questions. Statistical tools are not used in the analysis of results. Another observed tendency was that apart from management review the results were not used for the improvement of products or processes. Customers' complaints, analysis of changes in purchases, the results of consumer organisations' reports, analysis of customer needs were not used in customer satisfaction surveys.

An evaluation of suppliers has been conducted in all the examined companies in compliance with the documented instructions. However, what arouses reservations in all the cases is the selection of attributes subjected to evaluation, the manner of assessment which does not guarantee its objectivity. All the examined cases require another analysis of the acceptance criteria applied to evaluate suppliers so that the adopted criteria will be explicitly measurable and objective.

The research into personal features of the management staff and lower level managers revealed that compared to the results obtained for a representative group of managers, the management staff of the examined enterprises are characterised by high and very high communication skills, while in the areas of teaching the others and the skill of introducing changes these features reach an average level. The executive level managers received low notes for all the investigated features (communication skill, the skill of teaching the others and introducing changes). The obtained results concerning the personality features of people responsible for the company management may account for the problems observed when evaluating the effectiveness of QMS.

22.4 Summary

The conducted research indicates that quality management systems in the opinion of persons who manage organisations are evaluated on a high level. The quality system documentation contains a lot of general information, whereas it seldom refers to and describes processes owing to which the actual goals of an organisation are fulfilled. The research showed that documentation in all the examined cases does not meet the requirements of the process approach. The most frequent model of documentation is copying the table of contents of a standard. It is a convenient model to audit by comparing the documents with the provisions of the standard, but its drawback lies in the fact that it is difficult to find relations in the system, which in consequence leads to repetitions and the introduction of open requirements e.g. – and here let the author quote an excerpt from as Quality Manual – the highest level managers assure that the quality policy is suitable ..." without defining what this suitability means for the examined company. One can find many such open requirements, which have been directly transferred from the general requirement of the standard to the system documentation – this is observed practically for each requirement of the standard. The requirements contained in a standard should translate in QMS documentation into practices applied in an enterprise, which constitute the standard procedures. This cannot be done if the quality system in an organisation is implemented for 3 to 6 months. Effective implementation of QMS that will not be perceived by the employees as a bureaucratized system, which makes the work difficult as a result, should start with trainings initiating the company's management staff into the mysteries of quality management, analysis and interpretation of data. Next processes necessary to fulfil the organisation's goals should be defined. This is illustrated by the words of an American baseball player, who said that "… one can notice a lot by observing …". This sentence contains the essence of the continuous improvement idea, which forms the foundation of a quality management system.

On the basis of the conducted research a model of QMS implementation and functioning in an enterprise has been created. It is shown in fig. 22.6. The essence of a quality manage-

ment system is to compare the set goals with the obtained results and manage the resources (infrastructure, people and environment) in such a way that the discrepancy between the goals and obtained results is the smallest.

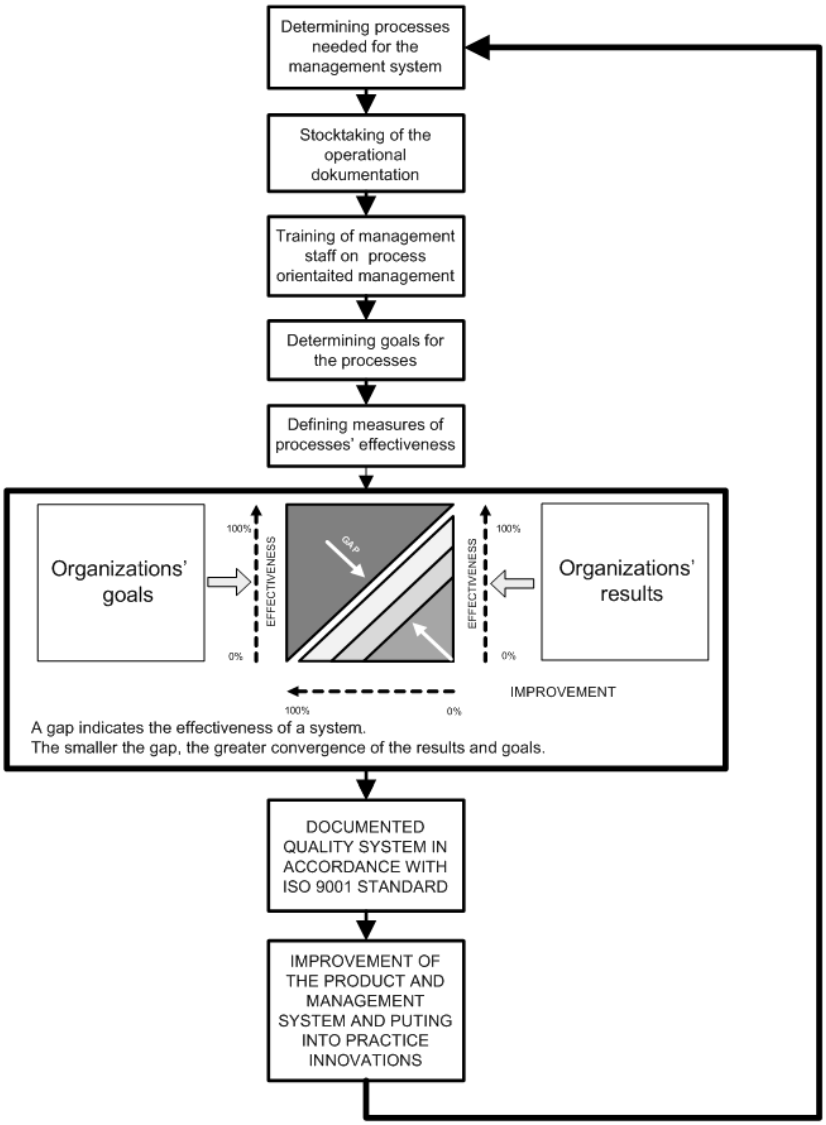

Fig. 22.6 A model of QMS implementation in a small enterprise
Source: own study

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