

CBS MANAGEMENT GROUP

ITEM 2.6

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THE APPLICABILITY OF TOTAL QUALITY MANAGEMENT TO NMHSs IN DEVELOPING COUNTRIES

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DRAFT

Summary and Purpose of the Document

This a draft document which needs further consideration by the CBS-MG.

This document considers the introduction of quality management in NMHSs of developing countries. It gives an overview of the general steps needed to implement a quality management system and outlines a rough time schedule and a cost estimation.

References:

- [1] <http://www.iso.ch> (Homepage of the International Organization for Standardization)
- [2] Quality management systems – Requirements (ISO 9001); EN ISO 9001:2000.
- [3] Quality management systems – Guidelines for performance improvements (ISO 9004), EN ISO 9004:2000.
- [4] Quality management systems – Fundamentals and vocabulary (ISO 9000), EN ISO 9000:2000.
- [5] Publicizing your ISO 9000 or ISO 14000 certification. ISO Central Secretariat 1998-05/8 000.

Background

1.1 Quality Management (QM) has always been a key issue in the private and public sectors – only the concepts have changed over the decades. Having focused on the concept of Quality Control in the 50's and 60's, and on the concept of Quality Assurance from the mid 60's until the beginning the 80's, it is the concept of Total Quality Management (TQM) which is now on the agenda. The "Total" in front of "Quality Management" means nothing else than that everyone in the organisation is involved in the final product or service to the customer.

1.2 The standard ISO 9000 is gradually being introduced into NMHSs of the developed world. Mainly due to the circumstances that the concept of QM is based on an extensive and well-developed industrial and private business. The introduction of QM and the future maintenance process which includes conducting audits in regular intervals and the installation of a continual improvement process will take up human and financial resources. One cost intensive factor which should not to be neglected is to build-up and to conserve well trained staff in QM. In addition, a NMHS has to pay every year for a system analysis and every 3 years for the renewal of the certificate. Another important element will be to constitute all responsibilities within the organisational structure and to set-up an adequate document management system.

1.3 When dealing with QM you have to have an understanding of the terms "certification", "registration" and "accreditation". The terms certification and registration can be used interchangeably. The organisation which issues ISO 9000 certifications is either referred to as certification body or as registration body. Accreditation is not the synonym for certification and registration. The accreditation is the procedure by which an authoritative body gives formal recognition that a body or a person is competent in carrying out a specific task. An accreditation body will approve a certification body as competent to carry out a ISO 9000 certification. ISO 9000 certifications means certification against the ISO 9000 standard. It is also false to describe a company as ISO certified or ISO registered. ISO operates no system for assessing the QM systems. There exists many certification bodies which offer independent conformity assessment services to provide confirmation QM systems measure up to ISO standards.

How to install a QM system – some general principles and an estimate of time and costs.

2.1 The basic elements of launching a project to introduce a QM system are to stay within a realistic time frame and to ensure the necessary man power. Having succeeded in establishing well trained QM staff and having reached some palpable objectives within a short period of time is a prime incentive for a sustainable implementation of a QM system.

2.2 The up-dated standard ISO 9001:2000 is based on a model of a process-based QM system. This new standard is focussing on 4 major processes of which interactions establish a comprehensive QM system. The major processes are:

- I Management Responsibility,
- II Resource Management,
- III Measurement, Analysis and Improvement,
- IV Product Realisation.

Those 4 major processes can be broken down into 21 sub-processes. Each of those sub-processes needs to be described and documented with regard to your very own Service if you want to have the guarantee that the QM system will work within your specific framework of laws, guidelines and organisational peculiarities (Annex 1, Figure 1).

2.3 The ISO 9000 defines a "process" as a set of interrelated or interacting activities which transforms inputs into outputs. Processes are generally carried out under controlled conditions to add value. A process of a NMHS can be, e.g., forecasting, warning, consultancy or the generation of meteorological data.

2.3.1 The introduction of a QM system can be split into 5 phases. The model of introducing the QM system in phases has been practised more or less in the same manner in most of the private and public sectors and is described in the respective literature.

2.3.2 Beforehand, the management of a NMHS can decide if they consider it as necessary to consult an external coach. The consultant can help in defining the key processes of a NMHS, give advice in how to implement the QM system into a hierarchical structure or simply brief the top and

middle management on their role and understanding of QM. The estimated costs of an external consultant is about from US\$ 1400,- to US\$ 2200 per day.

2.3.3 Phase 1 "Quality Policy": The top management defines the quality policy and the quality objectives. The quality policy needs to be understood and accepted by all staff members. The quality objectives should be measured by quality indices, e.g., data availability, data quality, timeliness or customer satisfaction. The objective of this first phase is to demonstrate the responsibility of the top management. Phase 1 should not take longer than 3 months.

2.3.4 Phase 2 "Education and Training": The well trained and well informed staff member is mostly relevant for the introduction of QM. Information takes place for instance, through regular meetings, by establishing quality circles, publications via the intranet or staff newspapers. The individual staff member can be motivated by positive performance appraisals and if possible by financial rewards or promotions in connection with more responsibility. The objectives of phase 2 are to promote and maintain staff motivation, systematical human resources development and to introduce a QM information mechanism within the NMHS. The management is responsible for filling in the staff position (or positions) of a quality manager and to install a QM team. Following the advice of experienced QM consultants the quality manager should always holds a staff position. Training courses as a quality manager are being offered by most of the major certification companies or quality associations which have offices and branches in many parts of the world (Annex 3). The training may only take as long as a few weeks but can be taken as well in steps over several months. For example, the costs for a 6 weeks training course of the German Society for Quality including an exam and a diploma as quality manager are about 3500,- per person.

2.3.5 Phase 3 "Process Analysis": The process has to be described and documented. A common tool is to use a flow diagram which leads to a description of each activity of the process. The process analysis defines all sub-processes and their owners, i.e., the one who carries the responsibility to achieve the quality objectives. It records as well the existing quality control procedures. The documentation of a key process and its sub-processes and individual activities should be concluded within 12 months. The only crucial factor for the accomplishment of this task is the man power necessary to pursue the documentation. The objective of this phase is to perform an inventory of the processes and help to prioritise the NMHS processes. The analysis of several different processes can be run simultaneously.

2.3.6 Phase 4 "Realisation and Implementation": Processes have to be optimised and be focussed on customers. Every single activity of a process has to be checked for standards, continuity with the following activities and for a customer oriented output. The processes and above all the process owner will be institutionalised by the appropriate documentation. Information management and control mechanism of non-conformities need to be implemented. The aim of this phase is to define the quality objectives, to create an interface to the customer, to introduce a document management system and to set-up a quality assurance system. This phase can be implemented within 12 months.

2.3.7 Phase 5 "Evaluation and Process Control": All staff members have been informed and trained appropriately. The quality objectives and the quality indices have been established and serve as indicator and measure for quality. At this stage, it is highly advisable to perform an internal audit or a pre-audit to close some possible gaps in the QM system. The audit which is always being performed by an external certification organisation is the final step before the registration and the issue of the certificate. The objective for this phase is to assess oneself and prove that you are able to continually improve your QM system. This phase should not take longer than 12 months. The following table contains some cost estimates, based on costs of the European market, for an audit which are dependent on the number of staff to be audited:

number of staff	pre-audit/audit (days)	costs in
	1	1 000 – 1 200
up to 19	2 – 3.5	2 200 – 4 000
20-59	4 – 4.5	3 500 – 5 200
60-250	5.5 – 7.5	4 500 – 8 500
250-1000	9.5 – 12	10 300 – 15 400
1000-4000	14.5 – 18.5	individual offer

The cost of the issue of the certificate and the annual permit is about \$ 500

Every 3 years the certificate expires and the process of registration has to be repeated. The consultant company may advise you to have your QM system analysed on an annual base which will cost per year roughly another 2 500 – 3 000,-.

2.4 The responsibility for the phases 2 to 5 are within the quality manager and the quality management team. Figure 2 (Annex 2) shows the time line of the implementation plan for a QM system and indicates the costs. The top management is actively engaged in phase 1 but should be continuously involved in a living QM system by acting upon management reviews. The single steps of the registration process is show in Figure 3.

Specific issues regarding developing countries

3.1 The need of developing countries NMHSs for ISO standards has been triggered by ICAO which requires the standardisation of the business area "Aviation" of all NMHSs until 2005 (*comment: exact ICAO reference and quote needed*). Other drivers for implementing ISO standards in developing countries are certainly to obtain a management mechanism which improve products and services and in doing this to enhance the chances in the global competition. In establishing a QM system, the individual NMHS assures its future by a more transparent, lean and as such more efficient hierarchy. Further, it benefits from higher qualified staff and hence from better employment possibilities. Training in QM techniques supports definitely human resources development and contributes to capacity building.

3.2 Considering the dramatic impact of Information and Communication Technology (ICT) (i.e., computer networks, use of internet and electronic mail) on achieving specific social and economical goals, it is necessary to look at the different grades of ICT in every RA. The figures in the following table can be only seen as a very rough indicator of having reached a high level in ICT. The figures have been estimated by comparing the number of Members hosting a web site to the overall number of Members per RA:

RA I	20%
RA II	40%
RA III	70%
RA IV	20%
RA V	30%
RA VI	70%

The following numbers provided by the UNDP underline as well the "digitally divide" among Members: Only 0.4% of the African population is using the internet, whereas in Southern Africa 4% and in the USA and in Germany up to 30% of the population are internet users. Though, it should be possible to adapt QM mechanism because setting-up a QM system can be independent on a perfect technical infrastructure. QM is more about systematically managing the work you are doing as has been stressed in section 2 of this document. Still, intranet and software tools like word processing software and some drawing software (e.g., Corel Draw, Power Point) will make it easier to document processes and to monitor more easily compliance with the chosen standards.

3.3 The management of financial resources and the man power will be one of the greatest obstacles of setting-up a QM system. The resource management is putting some additional strain on the NMHS's budget. The crucial question a NMHS has to answer is "who should do it?" and "do we have enough people to take care of the QM system?". The NMHS needs then to consider its financial resources. Is there enough money to pay for training courses, for eventual travel expenses and ,later on of course, for the registration process. Furthermore, the NMHS needs to consider if staff members have to be trained in their mother tongue. Is there possibly a trainer who visits the respective NMHS and who can teach without encountering any language, cultural, religious or political problems?

3.4 There is a network of certification organisations which is mainly based near industrial areas or strong private business areas. Most of them have branches or offices throughout the RAs and in developing countries (Annex 3). There are indications that major certification bodies cross borders and offer their services to adjacent countries as well. Besides, having the general opportunity of training and external consultancy, this option helps in limiting travel time and travel expenditures. For instance, the "Lloyds RCA" branch based in South Africa offers cross-boundary services to companies in Zimbabwe and Namibia. The NMHS will benefit from already existing local know-how, i.e., that the registration company has experience in the registration of an African products or services company.

3.5 To limit costs and to save on time and/or staff it would be feasible to have only parts or even only one part certificated of a NMHS. Each NMHS has to set priorities in its processes. A good start were for example having only the processes certified which have strong links to public services like "warnings" and "forecasts". This is successfully practised for instance by a few European NMHS.

3.6

Recommendations

4.1 Plan carefully the training of your staff. The better the staff is trained in QM, the less services NMHSs have to "buy".

4.2 Establish a staff position and designate a quality manager.

4.3 Prioritise the major processes of your NMHS. A partial or phased certification might save money and time.

4.4

4.5

Proposal

Why not create a WMO certificate of quality: you could set your own WMO standards and be able to adapt to the situation of Met services? But: this would take up WMO resources like creating a QM unit, writing manuals, giving guidance, offering training courses and creating a regular control mechanism to maintain the WMO quality standard.

4.6 Annex 1

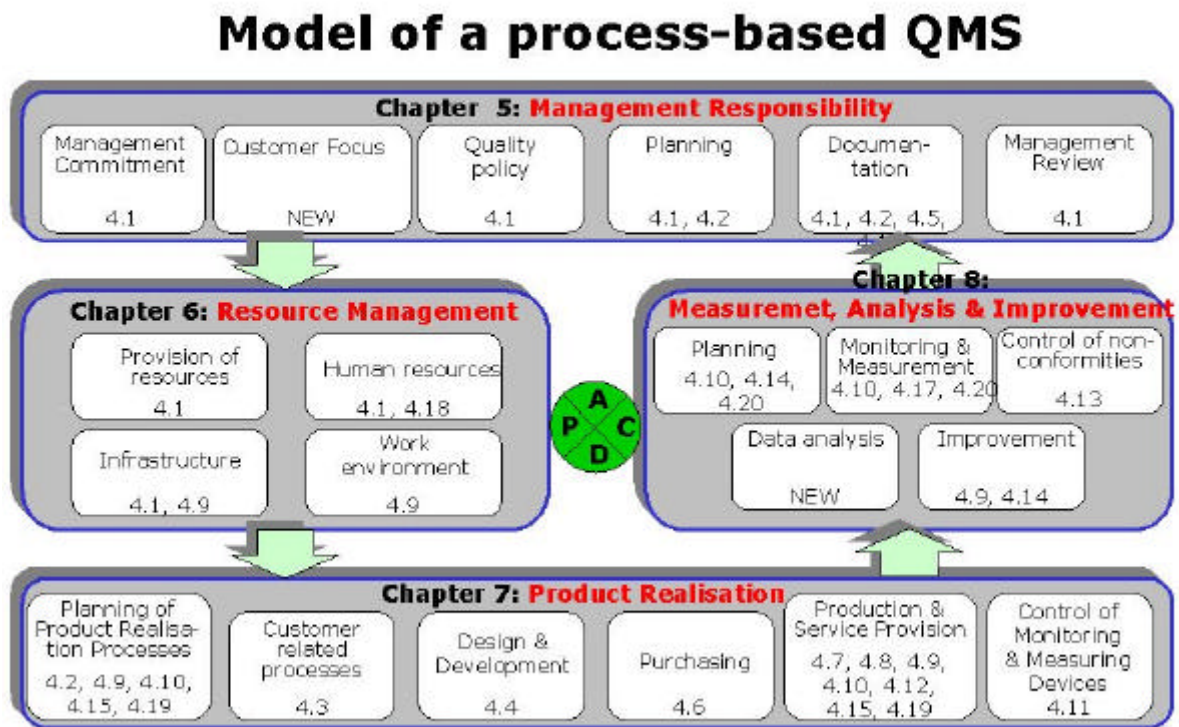


Figure 1: Model of a process-based quality management system based on the Deming-Circle (A=Act; P= Plan; D=Do; C=Check). The small numbers inside the graphics are related to the elements of the former standard ISO 9001:1994. The label "NEW" indicates which has been added for the ISO 9001:2000 standard. The "Chapters 5-8" referring to the chapters of the new ISO 9001:2000 each of them giving guidance to one of the major processes.

Annex 2

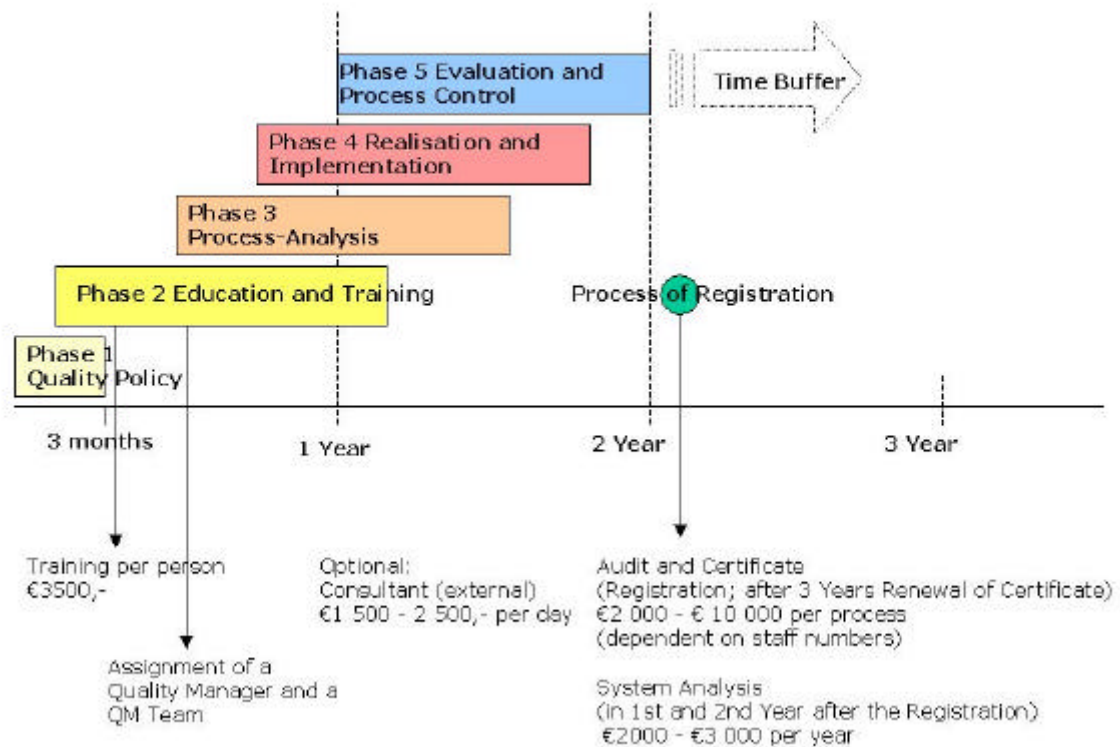


Figure 2: Project plan and cost estimates for the implementation of QM system for one NMHS process.

Process of Registration:

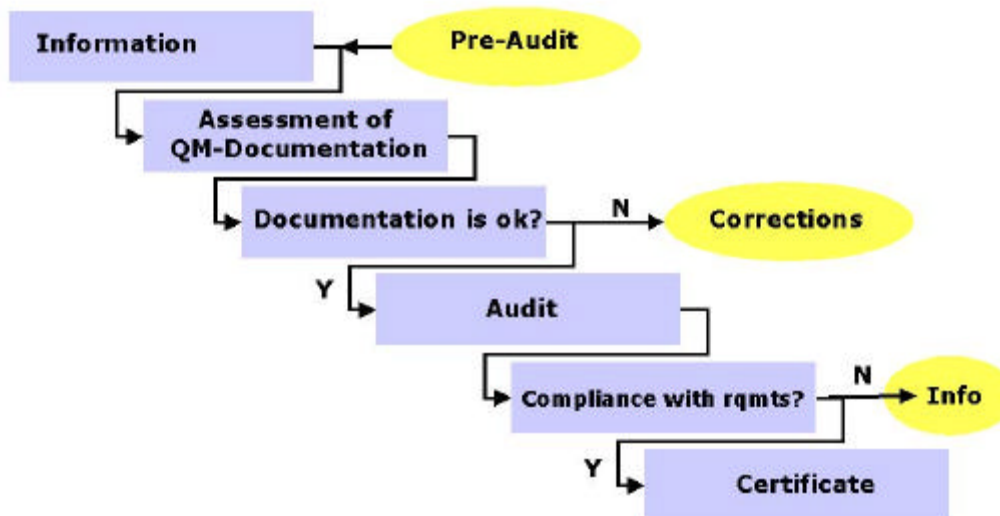


Figure 3: The individual steps of the process of registration.

Annex 3

GLOBALLY BASED CERTIFICATION ORGANISATIONS (SAMPLES)**IQNET (THE INTERNATIONAL CERTIFICATION NETWORK)**

<http://www.iqnet-certification.com>

The Association of Certification Bodies with contact points in the following countries:

Austria	Belgium	Brazil	Colombia
Czech Republic	Denmark	Germany	Greece
Hungary	Ireland	Israel	Italy
Japan	Korea	Netherlands	Norway
P.R. of China	Poland	Portugal	Republic of Argentina
Singapore	Slovenia	Spain	Switzerland
Venezuela			

SOCIÉTÉ GÉNÉRALE DE SURVEILLANCE -

SGS CERTIFICATION & CONSUMER PRODUCTS SERVICES

<http://www.sgs.com/>

SGS ICS is a globally based certification body. It is backed up by a global team of internationally accredited auditors in more than 60 countries.

The offer of different services (testing, assessment or certification) vary from country to country as well does the capabilities. Most of the offices assess products like wood products, food or textiles. But quite a few offices offer assessments or certification services for technical or even governmental organisations as well.

The detailed information is available via this Website:

[http://www.sgsgroup.com/sgs/psc/mer_contact.nsf/\\$\\$1_eng_officearea](http://www.sgsgroup.com/sgs/psc/mer_contact.nsf/$$1_eng_officearea)

SGS offices can be found in the following countries:

Argentina	Australia	Austria	Bangladesh
Belgium	Bolivia	Brazil	Bulgaria
Canada	Chile	China	Colombia
Croatia	Czech Republic	Denmark	Ecuador
Egypt	Finland	France	Germany
Ghana	Greece	Guatemala	Hong Kong
Hungary			
India	Indonesia	Iran	Italy
Jamaica	Japan	Kenya	Korea (Republic Of)
Latvia	Lebanon	Madagascar	Malaysia
Mauritius	Mexico	Morocco	Myanmar
New Zealand	Norway	Pakistan	Panama
Paraguay	Peru	Philippines	Poland
Portugal	Romania	Russian Federation	Saudi Arabia
Singapore	Slovakia	South Africa	Spain
Sri Lanka	Sweden	Switzerland	Taiwan
Thailand	The Netherlands	Tunisia	Turkey
Ukraine	United Arab Emirates	United Kingdom	United States of America
Uruguay	Venezuela	Vietnam	Zimbabwe

LLOYDS REGISTER QUALITY ASSURANCE

<http://www.lrqa.com>

LRQA is an Accredited Certification Body and is a subsidiary company of Lloyds Register, an international independent classification and inspection authority. Through the global network of offices, LRQA are able to offer Quality Management Systems assessment and certification services. The offices can be found in:

Australia	Austria	Belgium	China
Croatia	Czech Republic	Denmark	Finland
France	Germany	Greece	Hong Kong
India	Italy	Japan	Jordan
Korea (Republic Of)	The Netherlands	Poland	Portugal
Romania	Singapore	South Africa	Spain
Sweden	Taiwan	United Arab Emirates	United Kingdom
United States of America	Uruguay	Venezuela	Vietnam
Zimbabwe			

REGIONAL QUALITY ASSOCIATIONS

EUROPEAN ORGANISATION FOR QUALITY (EOQ)

<http://www.eoq.com/>

The EOQ is the European interdisciplinary organisation striving for effective improvement in the sphere of quality management as the co-ordinating body and catalyst of its Full Member Organisations (FMOs).

The EOQ was established in 1956 and its present membership is comprised of 34 national European quality organisations, as well as institutions, companies and individuals from all over the world.

However, the main objectives are to exchange know-how and to promote quality in Europe.



The map above shows the EOQ Full Member Organisations.

AMERICAN SOCIETY FOR QUALITY (ASQ)

<http://www.asq.org/>

The ASQ offers a certification service. In the following countries the ASQ has a section:

United States of America

Canada

Mexico

Puerto Rico

QUALITY SOCIETY OF AUSTRALASIA (QSA)

<http://www.qsanet.com/>

The QSA is providing information on products and services to organisations involved in quality management.

QUALITY ASSURANCE SERVICES (QAS)

Quality Assurance Services (QAS) is the largest, most widely established certification service in the Asia Pacific region covering Australia, New Zealand, Indonesia and India.

<http://www.qas.com.au>

QUALITY IN SOUTH AFRICA

<http://www.quality.co.za/>

This Web site is gathering information on consultant, training and certification services for the South-African Region but referring as well to certification services being performed by Lloyds Register Quality Assurance in the neighbour states Zimbabwe and Namibia.

There was no specific Web site found for an "African Quality Association".