Enforcing World Wide Standards through Strategic Implementation of ISO in Software Industry of Pakistan

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Abstract: *In the current era of software engineering; many software standards, methodologies, practices, models and guidelines are introduced to improve the quality and standardize the development of software products but software engineering seems immature and doesn't have proper standards like other types of engineering have.*

This report will give a brief introduction to ISO and will draw down its importance for software industry. It has also been tried to show as to how the world wide standards can be enforced to this industry by strategic implementation of ISO. In the later part of this report, ISO is compared with CMMI and a brief guideline, to implement ISO in Pakistan is included.

Keywords: *ISO, Software Quality, Quality Management System, Capability Maturity Model.*

1. INTRODUCTION

Software industry doesn't have absolute formula that can be utilized throughout the software development lifecycle to improve software process and quality but ISO and CMMI have developed the standards and guidelines which tend to improve the software quality by improving the software processes. There are many examples where improvement in software processes improved the software product quality. Pakistan software export board (PSEB) also encourages software industry to adopt ISO and in 2006 PSEB achieved its target of hundred plus ISO certified software companies which is a milestone and helps to enhance the IT image of quality products in future.

1.1 ISO

ISO is a greek word, which means equal. ISO is the largest organization which develops and publishes the international standards. ISO has a family of standards for quality management system and is very important in quality standards. Many software houses of Pakistan have adopted ISO, some of them are Itim Systems (Pvt.) Ltd, TPS Pakistan (Pvt.) Ltd, Avanza Solution (Pvt.) Ltd etc. According to PSEB there are more than hundred ISO certified companies whereas only over 25 undergoing CMMI rating and many more are in the process of doing so [1] [2].

The ISO has a family of standards and quality management system (QMS) that focuses on key elements, such as product maintainability, reliability, functionality, portability, efficiency and usability. This certification focuses on the development process, instead of the final product itself [3].

Apart form other benefits of ISO that controls the quality, there is one more positive point that is an organization that has been certified may publicly state that it is ISO 9001 certified which is a good way of attracting the customers.

2. QUALITY MANAGEMENT SYSTEM

Quality management system plays a vital role in the core business area of an organization. A set of policies, processes and procedures required for planning and execution (production / development / service) constitutes the QMS. By using QMS, different internal processes of an organization can be integrated; the intention behind this is to provide a processed approach for the project. Moreover various core business processes can be identified, measured, controlled and improved by the organizations with the help of QMS and this ultimately leads improved and more efficacious business performance [4].

2.1 Why Quality?

Implementing a Quality Management System will help to enhance customer satisfaction, improve internal processes and achieve consistency. Moreover it can minimize the risk of customer dissatisfaction. Quality can ensure the following [3]:

i) Providing high quality of software development and services.

ii) Understanding customer requirements and fulfilling them.
iii) On time delivery of releases.
iv) Continuously increasing the level of customer satisfaction.
v) Maintaining required level of resources in development team with core skills.
vi) Providing the appropriate environment and resources to do the desired work.
vii) Continually evaluate the effectiveness of quality management system and improve it.

2.2 The Process Model

A process is defined as any activity or operation which receives inputs and converts them to outputs. It covers almost all product and/or service activities and operations. Organisations need to precisely define and manage several inter-linked processes to function properly.

Given below is a process model for ISO 9001 that depicts its four principle elements following the Plan-Do-Check-Act cycle. It is a way of representing an organisation's QMS in relation to customer's requirements and the achievement of customer satisfaction [2].

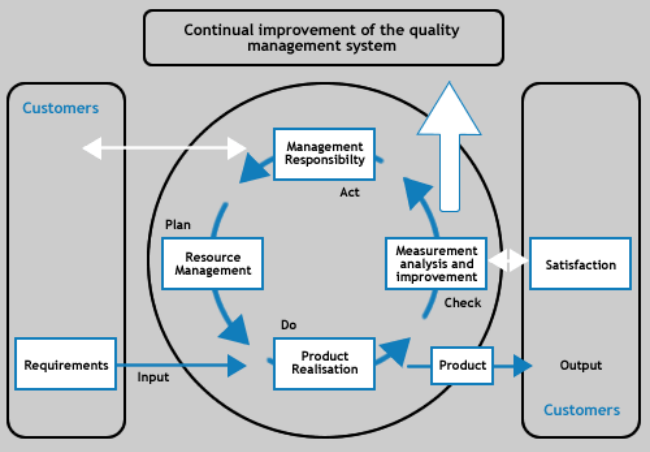

Figure 1 : Process Model

2.3 Advantages

It is commonly believed that proper quality management improves the end product, business and has a positive impact on investment, sales growth, market share, competitive advantage, sales margins, and avoidance of litigation [5]. The quality principles in ISO 9000:2000 are also encouraging as its guidelines provide a comprehensive model for quality management systems and can make the company competitive. According to a survey ISO 9000 increased the net profit and another survey which reported that the costs of registration were recovered in three years. ISO certification gives the following advantages [6].

i) Formulates a more effective and efficient operation.
ii) Augments customer satisfaction.
iii) Lessens audits.
iv) Improves marketing.
v) Increases employee awareness, motivation and morale.
vi) Raises international trade.
vii) Increases profit.
viii) Reduces waste and increases productivity.

A broad statistical study was carried out in which 800 Spanish companies found that ISO 9001 in itself doesn't bring about considerable improvement, the cause being the companies which are interested in ISO have already maintained quality management and were performing just as well before they got certified with ISO [5].

3. PROBLEMS AND CRITICISM

Unfavorably ISO has received criticism in books, journals and in software quality conference [5]. A common criticism is the amount of time, money and documentation required for certification. A considerable amount of time and money is required to get registered. In some cases a dedicated resource or consultant is required to identify and document the quality and lacking in the process. Some claim that it is only for documentation where as others believe that most of the documentation/paperwork has already been done if a company has documented its quality systems [5].

4. GUIDELINES TO IMPLEMENT ISO

There are two phases of ISO-9000 certification which are as follows:

i) Documentation
ii) Certification

4.1 Documentation

This phase involves the documentation of standards, procedures and forms, which can be done by the company itself or, a consultant can be hired. A documented quality system needs to be developed, which should satisfy the requirements of the ISO model chosen. Then the organization needs to implement that quality system.

To ensure quality management system, effective quality policy is needed to define and should be imbibed by everyone in the organization. As this quality policy is for everyone so, it should be defined in simple terms and should try to cover all the aspects of business as quality permeates every aspect of your business.

After creating the draft version of quality policy for your organization, the following can be started:

i) Defining the quality objectives for the organization.
ii) Defining the mission statement of the company by defining the Scope within which it is operated.
iii) Defining the product / project life cycle, formulate the standards and procedures needed to achieve and maintain the quality.
iv) Planning for the task/activities being taken place, including every member of the organization
v) Identifying the key process areas and preparing the procedures and standards to maintain the quality system.
vi) Monitoring the quality management system and ensuring that it is effective in maintaining the quality policy, taking necessary corrective and preventive actions if required [4].

4.2 Certification

An agency accredited in this regard can provide the certification.

Following are some tips for selecting the certification agency:

i) Your organization should have no link with the certification agency. Any sort of training or consultancy at any stage should not be taken from the certification body or their assessor under any circumstances.
ii) It is essential to make sure that the certification agency has sufficient experience in certifying companies operating in a similar business situation and environment as yours.
iii) There is a specific scope of the certification agencies within which they can operate and provide accredited certificates. You must ensure that your particular product or service that you intend to certify does fall into their accredited scopes.
iv) A critical aspect of establishing trust with the certification agency is its track record. A code of ethics and practices is being followed by all certification bodies by virtue of which they should at all times be fair and impartial. Assessment should be regarded as a learning exercise and should be of benefit to the organization in more than just getting a certificate.
v) If the country in which the accrediting board is situated coincides with the country to which you have an export market or potential or if it doesn't coincide then at least if any bilateral agreements exist, it ensures that there is no need for re-certification tomorrow by another agency.

4.3 Duration for Certification

Most certification bodies require a minimum of about three months from the formal implementation date of the quality system to the certification audit. It is necessary to at least complete the one complete internal audit of all parts of the system and taken appropriate corrective and preventive actions. Management review should be conducted after the audit and its decisions proved effective. This helps in identify the problems and to overcome them before the assessor finds them.

5. SOME TIPS FOR CONDUCTING INTERNAL AUDIT

i) Schedule the internal audit and make a list of auditor and auditee and inform them.
ii) Place all the QMS documents at a single location, e.g. VSS or File_Server.
iii) Previous CPARs and CPAR Log should also be present at the same location.
iv) The audit findings form and audit checklists should also be present at the same location.
v) Above mentioned documents should be accessible to auditor.
vi) You should not have duplicate and/or obsolete copies of any document.
vii) Auditors should study relevant QMS documents carefully and pick relevant checklist for audit.
viii) Get the updated copy of main process documents (e.g. Process Bible, Test Plan, etc.) of the assigned project/department prior to the audit and study those documents carefully.
ix) Ask randomly to anyone from the project/department team about quality policy, quality objectives and relevant position profile.
x) Verify current status of previous outstanding internal and external audit findings of assigned project/department and raise a new observation if the audit findings are still not completed.
xi) Verify that the processes are being followed as defined in the process documents of the project/department.
xii) Auditor should note down all the findings, if possible use common template for noting down the findings.
xiii) Auditor must have solid evidences for the findings.
xiv) Auditees should create required process documents (e.g. Process Bible, Test Plan, etc.) of the project/department before audit date if the documents are not already created.
xv) Update relevant process documents of the project/department before audit date if the processes have been changed. References should be correct in all the process documents.
xvi) Verify that all the documents are based on relevant standard template if a standard template is available for use.
xvii) Take appropriate actions for the findings.

6. COMPARISON OF ISO 9001:2000 WITH CMMI

To explore the differences between ISO and CMMI, first we need to explore the fundamental differences and how theses differences influences operation.

i) CMMI is developed by Defense Professionals / Systems / Software whereas ISO 9001 is developed by International Organization for Standardization.
ii) CMMI focuses on generic and specific practices with discipline amplifications, whereas, ISO 9001 focuses only on requirements which are same for all companies, industries, or disciplines.
iii) CMMI determines maturity. On the other hand, ISO 9001 is based on conformity.
iv) CMMI focuses on process improvement for better products whereas ISO 9001 focuses on quality management systems.
v) Description of ISO standard is very brief, where as CMMI model elaborates all the aspects.
vi) Information for institutionalization of processes is very detailed in CMMI model. On the other hand ISO is weak on institutionalization.
vii) In CMMI, tailoring of processes is needed because same process might not work for different types and sizes of projects. Where as only evidence from the practitioner is required as per standards.
viii) CMMI requires EPG (Engineering Process Group), ISO requires a MR (Management Representative).
ix) The key element in both standards is to understand and document the true requirements of the project/product.

7. CONCLUSION

This research focuses on enforcing world wide standards through strategic implementation of ISO in software industry of Pakistan. The research begun by the study of ISO and later, it was forwarded by comparing the ISO with CMMI and looking at the needs of software industry of Pakistan. Though there is some lack of quality management and there is a need to improve the software processes of software industry of Pakistan but many organizations have successfully implemented the ISO and now they are doing well.

Apart from above, some people criticize ISO and think that it's a waste but the fact is that many organizations are taking advantages of ISO certification and find it useful. On the other hand if an organization certifies not to improve the processes and quality but rather just for customer agreement requirement or for some ineffectual reason then it's simply waste of money and time.

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