Internal Quality Audit of R.M.C Plant Based on QCI Criteria

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Abstract- Internal Quality Audit is the process of systematically inspection of the quality system carried out by an internal or external quality auditor or an audit team. It plays a significant role in an organization's quality management system and proves to be a salient element in standardization of organization under quality control systems certified as ISO 9001. Internal Quality audits can play a vital part of compliance or regulatory requirements. The process of internal quality audit in the education system focused essentially on procedural issues instead on the results or the effectiveness of a quality system implementation. Audits can also be utilized for safety purposes. It is one of the dominant safety monitoring techniques and 'a successful way to avoid complacency and features deteriorating conditions', particularly when the auditing focus not only on compliance but also on effectiveness. The processes and tasks that a quality audit involves can be conduct by using a wide range of software and self-assessment tools such as formulated forms and requirement list as per the kind and size of organization. Some of these relate specially to quality in terms of strength for achieving purpose and conformance to standards, while others relate to Quality value or, more precisely, to the value of poor quality. It helps to clearly understand the time cost and quality pyramid for a particular organization and proved means to increase its effectiveness by providing effective action plan. The purpose of this paper is to offer a conceptual model which is based on the article of ISO 9001:2015. The model comprise of main variables such as: Knowledge of ISO 9001:2015, Benefit of ISO 9001:2015, financial performance of companies, and organizational learning capability. However, the relationship between organizational learning capability and financial performance of RMC plant based on QCI criteria's is included in the model. Moreover, mediating role of organizational learning capability is additionally considered within the model of this study.

Index Terms- ISO9001, compliance, safety monitoring technique, effectiveness, time, cost, quality, financial performance, RMC plant, QCI criteria's

I. INTRODUCTION

1.1 Internal Quality Audit

Quality Internal Audit is the process of systematically inspection of the quality system carried out by an internal or external quality auditor or an audit team. It plays a significant role in an organization's quality management system and proves to be a salient element in standardization of organization under quality control systems certified as ISO 9001.

Quality audits are periodically performed at definite time intervals and ensure that the company has clearly describe the internal quality conditions , system monitoring course of action and their links for effective action. This could help the auditor to check whether the company should proceeds with the defined quality system processes or not and may involve course of action or results-based assessment criteria for quality assurance or not and have worldwide certification based on common regulatory terms and conditions.

With advance of the ISO9001 standards from the 1994 to 2015, the main focus of the audits has completely shifted from purely procedural adherence to measurement of the particular effectiveness of action plans under the standard Quality Management System (QMS) and the results that are achieved through the application of same.

Internal Quality Audits is the most important management tool use for justify the objective evidence of processes, to assess how successfully processes are implemented, for judging the effectiveness at various targeted levels, to produce remedial concerning reduction and elimination of problem areas. For the advantage of the organization, quality auditing should not only report non-conformities and corrective actions, but also underline areas of fine practices. This way other departments may share information's that are associated with them and enhance their working practices as a result, also contributing to continual improvement.

Internal Quality audits can play a vital part of compliance or regulatory requirements. Audits can also be utilized for safety purposes. It is one of the dominant safety monitoring tool and a successful way to avoid complacency and feature deteriorating conditions, particularly when the auditing focus not only on compliance but also on effectiveness.

The processes and tasks that a quality audit involves can be conduct by using a wide range of software and self-assessment tools such as formulated forms and requirement list as per the type and size of organization. Some of these relates specially to quality in teams of strength for achieving purpose and conformance standards, while others relate it to Quality value or, more precisely, to the value of poor quality. It helps to clearly understand the time cost and quality pyramid for a particular organization and proved means to increase its effectiveness by providing effective action plan.

1.2 Total Quality Management

TQM may be a globally unfold expression to typically describe strategies and tools for organizations and firms to unceasingly develop quality product or services to customers. The origin of the term "Total Quality Management" or "TQM" is commonly cited be a yank director A. Shewart, however several scientists, consultants and establishments have developed loads of aspects and principles, that square measure supported TQM. It had been additionally in a very main role of the standard world within the 70´s and 80´s and light-emitting diode to the launching of the ISO 9000-series of standards within the 90´s. Since those days, TQM has evolved to cover even more; consistent with Lecklin quality should be thought-about to lay eyes on the leadership, strategic designing in addition as development of the organization (Lecklin, p. 17). To boot, client focus was antecedently seen as an external issue, however is currently thought-about to surpass everything else. "Customer's wants square measure the foremost thought in quality work", states Lecklin. AN adaptation of Lecklin's illustration underlines the importance of the client in trendy interpretation of TQM.

Fig.1. Total Quality Management Cycle

1.3 ISO 9001:2015 International Standard Edition

ISO 9001:2015 (ISO, 2015) was published in September 2015 comprising a twofold goal: reliability- by ensuring that organizations who meet its requirements on a consistent basis provide products and services that convince their customers' needs and expectations addressing the proper statutory and regulatory requirements; flexibility- by developing the 2015 edition appropriate and suitable for the present complex, demanding and dynamic business environments. According to Fonseca (2015a) a number of the foremost new approaches of the ISO 9001:2015 are:

a. A strengthened approach enabling managers to demonstrate their Leadership throughout all levels of the organization;
b. A reinforced integration with the organization business and other Management systems (MS) components;
c. The consideration of the organization's context (including its internal Culture, external factors, and also the requirements and expectations of the relevant stakeholders);
d. The adoption of risk-based-thinking;
e. The introduction of novel concepts such as organizational knowledge and Change management;
f. The consideration of both continual and disruptive improvement;
g. The adoption of more pragmatic and non-prescriptive requirements with
h. Greater emphasis on the achievement of results and less on documentation

II. STUDY AREA AND RELEVANCE

2.1 ISO 9000 Series

The International Organization for Standardization (ISO) is an organization that evolve and retain standards (Bergman & Klefsjö, 2002), of which many concerns good practices and making industry more effective and efficient (ISO, 2014b). Many national standardization bodies around the world are connected to ISO, of which the Swedish Standards Institute (SIS) is working with the ISO standards in Sweden (Bergman & Klefsjö, 2002).

The ISO 9000 series is a set of standards handled by ISO. It addresses various areas in the field of quality management and is updated and adjusted continuously. The standards primarily provide tools and guidance in order to improve effectiveness and efficiency of organizations (ISO, 2014c).

Currently there are four standards within the ISO 9000 family, which are (ISO, 2014c):

a. ISO 9000:2005 - Describes the basic principles and language.
b. ISO 9001:2008 - Covers the requirements of a QMS.
c. ISO 9004:2009 - Provides guidance on how to make QMS more effective and efficient.
d. ISO 19011:2011 - Addresses how the internal and external audits are planned, implemented and monitored.

The standard speaks of six principles which serve as basis for auditing that are

a. Integrity
b. Fair Presentation
c. Due Professional Care
d. Confidentiality
e. Independence
f. Evidence-Based Approach.

Combined, these principles make auditing a reliable and useful tool to support the control of QMS and policies. By following the guidance in the ISO 19011 standard the company should be able to improve its performance in a secure and controlled way. At the end of an audit many conclusions can often be drawn. Audit conclusions may, for example, address issues such as; to what degree the QMS meets stated objectives, root causes of findings and similar findings made in different audits for the purpose of identifying trends. Based on these audit conclusions, changes and suggestions can be made in order to improve the QMS as well as the audit programme.

2.2 Quality Auditing

An organisation can base their QMS on the ISO 9000 series, with all the requirements on the system pinpointed in the ISO 9001

standard. The ISO 19011 standard could on the other hand be used for guidance on the QMS audits. The purpose of quality audits is to make sure that the processes in the organisation are constructed and followed to deliver the contracted value to the customer. Each performed audit leads to some audit findings that either indicate conformity or nonconformity with audit criteria. A nonconformity is defined as a 'nonfulfilment of a requirement' and will be an example occur when a routine is performed differently than described within the QMS. Nonconformities may be graded by severity and should, together with supporting audit evidence, be recorded and presented. Good practices, opportunities for improvement and recommendations to the auditee should also be included in the audit findings when specified by the company's audit plan. Audits are according to ISO a vital part of the management system approach, since they check to what degree the organisation's achievements meet their objectives. There are besides this other positive effects from audits on the QMS.

2.3 Internal Audits

The main focuses of internal audits often are to determine how effective the QMS is, how well the set standards are met, to confirm the level of implementation of new solutions and finally to seek new opportunities for additional improvements. Shorter lead times or better information sharing between divisions are examples of that. Once the purpose of the internal audits is defined, audit criteria can be chosen standard regulates the use of internal audit at the company. It states that 'the organisation shall conduct internal audits at planned intervals' This is done in order to determine whether the QMS:

a. Meets the other requirements of the ISO 9001 standard and the requirements of the QMS itself.
b. Conforms to the planned arrangements.
c. Is effectively implemented and maintained.

The audits shall be meted out in an objective and impartial manner. The audit method, scope, criteria and frequency shall be defined. Also, the audit programme shall be planned, procedures documented and records of the audits maintained.

III. MODEL OF THE PROCESSED - BASED QMS

Quality management system (QMS) is an organization which helps in the documentation ways of working in order to fulfill their stakeholders' and customers' requirements on the business (Wahlman, 2004). A QMS is based on eight principles in the ISO standards, for a detailed description of the ISO standards see 3.2 ISO 9000 series. Those principles are as follows (Bergman & Klefsjö, 2002; SIS, 2005):

a. Customer focus
b. Leadership
c. Involvement of people
d. Process approach
e. System approach to management
f. Continual improvement
g. Factual approach to decision making
h. Mutually beneficial supplier relationships

Much of the QMS is built around the identification and management of processes and the interactions between them. Any activity, or set of activities, which transforms input to output is considered a process (SIS, 2005). Processes are used to supply the customer with the demanded product or service, trying to use the necessary resources as efficiently as possible (Bergman & Klefsjö, 2002).

Bergman & Klefsjö (2002) mean that focus should be at managing and improving the process instead of using a lot of energy in "putting out fires", moving from one emergency to the next. Finding solutions for nonconformities will add knowledge necessary to improve the process, but the focus should never be to fix smaller problems occurring once. Making temporary solutions will just make the process more complex. Improving processes is important to possess a holistic approach to avoid sub-optimizing (Bergman & Klefsjö, 2002). This is often called the "process approach" (SIS, 2005). The goal of this approach is to improve (Bergman & Klefsjö, 2002):

a. The quality - how well the process fulfills the customer demand.
b. The effect - how well resources are used.
c. The flexibility - how easily the method is changed to new conditions.

The processed-based QMS, described in the ISO standards, is focusing on customer requirements of the organization. In order to monitor customer satisfaction, the organization must analyses and evaluates information regarding the perceived extent to which customer requirements have been met. Based on that information, continual improvements of the QMS are often made (SIS, 2005). A model of the processed-based QMS used in the ISO standards can be seen in figure Processes, policies and goals are all components that should be described in the QMS (Wahlman, 2004). The quality goals should be aligned with the standard policy and it's has to be possible to measure the degree to which they need to achieved (SIS, 2005).

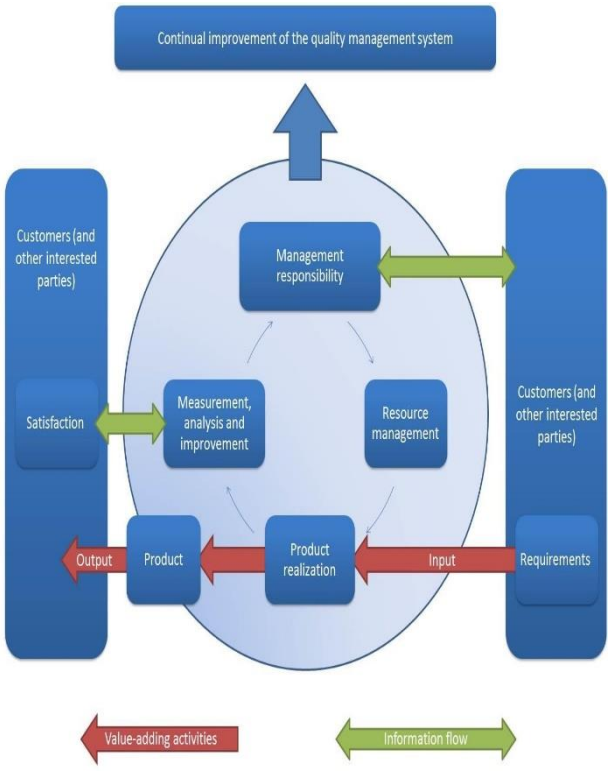

Fig.2. Model of the processed-based QMS

There are many reasons why to maintain a QMS in an organization. If kept effective, it will lead to increased customer satisfaction, more efficient resource use and improved risk management (ISO, 2014a). Documented procedures are much clearer than those only spread by word and they are also easier to follow-up and improve. Besides, documented procedures are easier to spread inside and outside the organization (Wahlman, 2004), something that grows in importance with the size of the company (ISO, 2014a).

3.1 Internal Audit Process

The internal quality audit process is followed in the similar way as shown in the figure below. The auditor starts by collecting information about the process to be audited, which could be standards, policies and procedures. The process activities are then thoroughly tested through interviews, observations and checklists. Any nonconformities or improvement opportunities are noted and collected in a report.

Fig.3. Internal Quality Audit Process

The audit method, scope, criteria and frequency shall be defined. Also, the audit program shall be planned, procedures documented and records of the audits maintained. For the internal audits to be ready to become a viable tool it is required for:

a. The audit is independent and objective
b. It serves as a consulting tool that will add value to the organization.
c. It improves the operations and lets the organization achieve its goals through systematic and disciplined efficiency.

Internal quality audit is a powerful tool if used appropriately, as it is able to; analyzed problem and risk areas cut costs and improve the overall business. To utilize the advantages of quality audits, as of the full ISO 9001 standard, the management's support and enthusiasm are paramount**.** On the idea of the all the necessities mentioned by ISO 9001-2015, case study was carried out of Ready Mix Concrete plant (RMC) supported on criteria mentioned by Quality Council of India (QCI) in QCI quality manual. Three internal audits at specific time intervals were carried out of the RMC plant; findings of the audit are summarized and compared with one another to test the effectiveness of every audit over the other by considering the efficiency of the plant.

IV. RISK AND CHALLENGES

For the internal audits to be ready to become a viable tool it is required for the:

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b. It serves as a consulting tool that will add value to the organization.
c. It improves the operations and lets the organization achieve its goals through systematic and disciplined efficiency.

Table I: Strengths and Weaknesses of Internal Audits

Strengths	Weaknesses
Potential to find improvements	Fall short of enabling performance improvement
Great when comparing with criteria	Often the auditor lack deep knowledge of the audited process
Objective	Often the auditees lack motivation to follow-up nonconformities
Generally leading to better control of the organization	May become too simple
Holistic approach	Auditees may perceive audit result as personal criticism

4.1 Risks with Internal Audits

a. Audits may become too simple. One wants to avoid complaining about the linguistics and how the documents are written. It is possible to avoid this by setting clear objectives and goals with the audit.
b. In the planning phase all functions in a process should be covered, if the auditor is not familiar with the area it can be easy to miss unobvious functions.
c. The auditee could take the audit personally, especially during internal auditing. The questions may be perceived as criticism of the person, when it is meant to be towards the process. In this it is important that the auditee interpret that the audit is a positive activity and a chance for improvements.

V. AUDITING OF RMC PLANT

5.1Objective: Verification of the effective implementation of the Criteria for RMC Production Control.

5.2 Opening Meeting: In the Opening Meeting, the Team leader shall ask the Management Representative to show the list out the customer's orders undertaken in last 6 months including those to be processed during the day (for verification, the auditor is liberal to select any five random orders since last audit including a minimum of one from those executed during the day of the audit). The audit plan shall be modified accordingly. During the opening meeting, the Team leader shall collect information on the true situation of the plant and also the changes concerning RMC plant, equipment, raw materials and anything relevant.

5.3 Safety during audits: The Audit involves risks linked to the requirements to travel to work environments. Responsibility for risk analysis and also the identification of the foremost suitable

means of protection is of the RMC plant that manages the building or factory. However, auditors must have personal protective equipment which may be reasonably required to run within the security checks. Specifically, every auditor must go to the sites to verify with at least:

a. helmet
b. safety shoes
c. goggles
d. ear protectors
e. high visibility vest

5.4 Use of the Check List: The Audit had been conducted for every type of certification (RMC Capability Certification and RMC 9001+ Capability Certification) in accordance with guidelines given in QCI quality manual. The whole check list in terms of formatted forms is attached in Annexure.

5.5 Capability Certification: The audit had been conducted with the assistance of the Check List included in Section B of the Criteria document attached as Annexure. The auditor shall fill within the entire Check List with the remarks of objective evidence of compliance/noncompliance within the production facility itself, and not within the office.

5.6 RMC 9001+ Capability Certification: The audit had been conducted with the assistance of a Check List prepared by the CB subject to the following:

a. The check list must embed all the necessities of the "RMC Production Control Criteria"
b. The check list must address all the necessities of ISO 9001 standard.

Check list used by CBs shall be verified by the Accreditation Body to confirm the compliance with the reference documents. Competence of individuals at site shall be audited in each plant to verify the effective knowledge of internal procedures and applicable standards.

VI. CONCLUSION

Any nonconformity needs to be reacted upon by taking actions to control it and deal with the implication. Once identified, nonconformity should trigger a corrective action so as to get rid of the explanation for the nonconformity and prevent its recurrence. The effectiveness of actions taken must be evaluated and documented, along with the originally reported information about the nonconformity / corrective action and also the results achieved. To establish criteria for determining the relevance of evidences considered as NCs to scale back variation among auditors and CBs.

The certified clients shall be shown with a green colour code on the Certification Body's website as a indication of their current status. Just in case critical NCs are raised, the status shall be classified as 'Certification Status under Review' and colour coded as Orange. Just in case the certification is suspended, the colour code Red would be used to indicate the status of certification. Any non-compliance observed during audit, for which corrective actions are taken on-site during audit and not raised as non-conformity, shall however be reported within the report findings. The Non Conformities, related corrections and corrective actions shall be:

a. Prepared by the Team leader before the Closing Meeting.
b. Discussed with the Customer.
c. Countersigned by the Team leader and also the Customer's representative.
d. Sent to the CB for verification.

Fig.4. Classification of Non- Conformity and Closure

Non Conformity	Description	Time frame for closure
Critical	Non compliance with a requirement which indicates serious failure of the plant's capability to produce and deliver RMC to meet the customer requirements	Within 15 days. Corrective Actions shall be submitted to CB within 10 days. Onsite verification to be undertaken within 5 days and decision taken either to close the NCs or suspend certification
Major	Non conformity regarding a Management system requirement which does not allow the production and delivery process to meet the customer requirements (applicable to ISO 9001 requirements only as defined by CB), or As given in the Criteria for classification below	Within 1 month. Evidences of closure shall be provided to the CB; verification to be done on site
Minor	Non compliance with a requirement which does not compromise either the overall management system effectiveness or the production and delivery process	Within 3 months; Evidences of closure shall be provided to the CB; verification to be done in the following surveillance audit

Fig.5. Criteria for Classification

Critical NCs	Major NCs	Minor NCs
Check List items as under: 3.2.1.1 (Storage - Cement only), 3.2.1.2 (Batching & Mixing), 3.3 (Laboratory), 5 (Concrete Mix Design), 6 (Production and Delivery), 6.1 (Identification and traceability), 7 (Control of Process control equipment and measurements)	3.2.1.1 (Storage – other than Cement), 3.2.1.3 (Delivery Fleet), 3.4 (Key Personnel), 4 (Control of Incoming materials), 8 (Complaints)	6.2 (Control of non-conforming products), 9 (Feedback)

Audit Report: The CBs sent the Audit Report within 7 days from the date of the completion of the audit to the client. The Audit report:

a. Describe the structure of the audited RMC plant
b. Specified all the part of the RMC plant to which each NC is addressed
c. The processes excluded by the Scope of the certification, if any

The research question 'why internal audits?' and its sub-questions have been answered. The second research question 'In what way, if any, do auditors justify their judgment about the effectiveness of the quality audit system?' is answered. Thus, it seems necessary to introduce a new model for future audit practices. The literature suggests that in process- oriented auditing, the auditor should not only audit the input, output, and transformative features of a process. The auditor should also audit the progress of the audit within set boundaries, as this would deliver measurable information about the capability of any process. Furthermore, the design and process of audit action should be guided by the individual contextual levers of a business entity, as this context shapes the organizational construct.

Therefore, standardized checklists and audit schedules are obsolete and auditors must have competence in business administration. The auditor's judgment is based on a broad range of evidence including observed actions, discussed information, and analyzed records. The analysis had then lead to a picture that allows the auditor to make a judgment based on evidence and indicators.

Table II: Overview of Intended, Observed and Suggested Future Practice

Intended practice	**Observed practice**	**Suggested practices**
Process-oriented auditing	Outcome- oriented	Progress-oriented
Systematic processing	Sequential processing	Contextual
Objective evidence	Evidence- oriented evaluation (paper-based, haptic evidence)	Evidence and indicator-oriented evaluation (haptic, optic, and acoustic evidence)
Principle-based	Arbitrary	Compliant with rules and principles
Appreciative	Dominant	Encouraging
Critical	Non-critical	Detailed
Independent and autonomous	Pragmatic or accommodating	Pressure-free
Leading	Manoeuvring through the	Leading by exerting expert power
	schedule and checklists	
Ethical conduct	Prone to being open to blackmail	Led by a strong organizational culture

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