

Role of Quality Management System in Improving the Quality of EIA

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Abstract

The quality of Environmental Impact Assessment (EIA) very much depends on the efficiency of the management system of the EIA consultant organizations. As per statutory requirements, EIA Consultant Organisations must have an accreditation for carrying out the EIA study in India from the National Accreditation Board for Education and Training (NABET) which is a nodal organization under the Quality Council of India (QCI) as per Gazette Notification dated March 3, 2016. The Quality Management System (QMS) is an integral part of the accreditation process, hence the study provides an analysis of the effectiveness of QMS for Accredited EIA Consultant Organisations (ACOs) in reality. The relationship between QMS and EIA reports is analysed from NABET database for various accredited consultant organizations across the country. The study revealed that the quality management system has a significant impact on the EIA reports. The major factors affecting EIA quality are lack of implementation of a quality system, inadequate knowledge of the system and lack of data interpretation. A regular review of QMS by NABET helps maintain the quality at every step of EIA. It suggests that there is a scope for developing a strategic framework to reach excellence in EIA reports through developing a strategic management system for the betterment of society and environment.



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Introduction


There is a trade-off between economic development and environmental protection. It depends on how well this trade-off between these two drivers is managed which becomes critical for any country

aspiring for high growth to meet its development objectives. A well-executed Environmental Impact Assessment (EIA) for projects helps in proactively addressing the environment protection aspect during the project life cycle, which very much depends

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on the site selection, construction and operation style. An environmental clearance process is a key mechanism for striking a balance between the two contrasting drivers of growth. In the EIA, environment and social considerations are given due importance in the decision-making by clearly evaluating the consequences of the proposed activity before any action is taken. Environmental Impact Assessment (EIA) ensures optimal use of natural resources for sustainable development¹.

An EIA is a powerful management tool that can identify the key environment and social impacts of a project and measures for mitigating them prior to taking a decision on its implementation, modify and improve design, ensure efficient resource use, enhance social aspects, informed decision-making and condition-setting, avoid serious and irreversible damage to the environment. This will eventually lead to protection of human health and safety.

In India, the EIA is considered to be a crucial decision-making tool. The impact assessment was started in the 90s with the river valley projects. Over the periods, the scope has subsequently been enhanced to cover almost all the developmental sectors such as chemical industries, thermal power projects, mining projects, etc. Under the Environment Protection Act, 1986, Ministry of Environment, Forests & Climate Change (MoEF & CC) issued a second Notification dated Sep. 14, 2006, making it mandatory for various industrial and developmental projects to obtain environmental clearance in advance through the submission of EIA reports. The new guidelines which are under formulation are expected to be notified shortly. EIA projects or activities shall require prior environmental clearance from the concerned regulatory authority. Environment Impact Assessment Notification of 2006 has decentralized the environmental clearance projects by categorizing the developmental projects in two categories, i.e., Category A (national level appraisal) and Category B (state level appraisal).

EIA process involves many steps such as screening, preliminary assessment, scoping, including public hearing and appraisal. Ideally, the findings of EIA are expected to be communicated to all the stakeholders viz. developers, investors, regulators,

planners, politicians, affected communities, etc². A well written executive summary in a very simple word impresses the policymakers. However, in the present EIA evaluation process, quality of the Executive Summary, in spite of great role, is not given due importance.³

To improve the quality of EIA reports in the country, the Ministry of Environment, Forests & Climate Change (MoEF & CC) had decided that a suitable Accreditation Scheme be prepared to identify consultants capable of developing quality EIAs. Accordingly, the National Accreditation Board for Education and Training (NABET), a constituent board of Quality Council of India (QCI) developed a scheme which was launched voluntarily in August 2007. Later, MoEF & CC has issued an Office Memorandum No. F.No. J-11013/77/2004-IA II (I) dated Dec. 2, 2009, for the preparation of EIA reports by Accredited Consultant Organizations (ACOs) and further made the Accreditation Scheme mandatory through a Gazette Notification dated March 3, 2016. The assessment of ACOs is conducted based on the following five parameters i.e., human resources, field investigations, laboratory systems, Quality Management System (QMS), quality of EIAs and organizational commitment.^{4,3}

The main objective of this study was to evaluate the effectiveness of QMS for Accredited Consulting Organizations (ACOs) and its relation in improving the quality of EIAs reports. The authors hope that this study will be useful for all the organizations, regardless of their scale (Small / Medium / Large), the scope of accreditation & location of work, to evaluate the system effectiveness and identify the areas for improving the performance.

Quality Management System

It is a framework of processes to achieve the quality objectives of the organization consistently, efficiently and effectively meeting customer requirements. Quality Management System aims to improve the quality of the service/product. In this paper, the product is EIA Reports. A study by Neyestani (2016) has revealed that the implementation of QMS was very effective in achieving customer satisfaction.⁵ It is a requisite to establish and maintain QMS as per the criteria provided in Appendix B of NABET Scheme (Table 1), QMS has requirements of

ISO-9001(2008) and some specific requirements for EIA reports hence, the organization needs to acquaint itself with ISO 9001. The role of few QMS procedures in improving the EIA has reference from ISO-9001 (2008) requirement. NABET accreditation emphasizes on the documentation and implementation of the following ten procedures. QMS affects the performance of an organization. QMS

has been reported more effective for organizational performance than environmental standard.⁶ The criteria for evaluation of the QMS by NABET is given in Table 1. The authors have mentioned specifically role of each QMS procedure with EIA in the last column. In the process of assessment, each procedure of ten, given in Table 1, is evaluated and the scores are allotted.

Table 1: Ten procedures for evaluation of the QMS and its relation with EIA

S. No (i)	Procedure (ii)	Reference (iii)	Relation with EIA (iv)
1.	Quality Policy	ISO-9001(2008)	To define the purpose of EIA business in the policy document.
2.	Control of documents including records	ISO-9001(2008)	To establish a set of documents to guide the team to follow documented guidelines or steps to perform the EIA activities systematically.
3	Performance measurement and review	ISO-9001(2008)	To ensure that the quality of EIA reports & experts involved in the task of impact assessment is maintained. NABET has defined criteria to assess the quality of an EIA report in the scheme.
4	Actions were taken to address Non-conformances	ISO-9001(2008)	To take appropriate action by following the defined procedure for addressing Non-conformances which can be perceived during the execution of internal or external audits, public hearing, EAC/ SEAC meetings, NABET assessments, customer feedback, etc.
5	Identification, Retention & Assessment of performance of empanelled experts	NABET Specific Requirements	To ensure that the empanelled experts are engaged by the EIA consultant through the due process of identification, retentions and their performance measures for having professionally trained personnel.
6	Collection/measurement of primary data	NABET Specific Requirements	To collect credible baseline information for establishing ground reality.
7	Collation, synthesis, and interpretation of secondary data	NABET Specific Requirements	To use the secondary data (not generated through direct fieldwork) for supporting the report effectively. It should be authentic, credible, appropriate and relevant.
8	Work outsourced	NABET Specific Requirements	To use the secondary data (not generated through direct fieldwork) for supporting the report effectively. It should be authentic, credible,

8	Work outsourced	NABET Specific Requirements	appropriate and relevant. To get the quality inputs related to EIA studies by an external agency with objectivity and professionalism.
9	Laboratory work for baseline data	NABET Specific Requirements	To assess the capability of the engaging laboratory for analytical work so that poor, inconsistent, contradictory or inaccurate site data. is avoided
10	Complaints and appeals	ISO-9001 (2008)	To addresses the concerns of the public and stakeholders with a satisfactory response for further improvement.

Methodology

In this paper, an attempt has been made to put forth the importance of Quality Management System in the preparation of Environmental Impact Assessment (EIA) reports in India. The paper discusses the role of QMS to assess the implications of procedures prepared by the organization on the EIA reports, the following three parameters are used in the evaluation- i) Correlation between the QMS and Quality of EIA, ii) QMS performance of a new organization and iii) ACO's performance based on quality of EIA reports.

The data were collected during the onsite assessments conducted during 2016-2019. In the process of assessment, each procedure given in Table 1 is evaluated on the basis of compliance to the defined guidelines (section 4.1.1 to 4.1.10) and the scores are allotted. It is the actual score given by assessors during the assessment of the accredited organizations on QMS and Quality of EIAs. Out of 178 ACOs, a nearly stratified random sample of 50 organizations (small, medium or large) were taken into consideration and analysed keeping in mind the subjectivity and the human (with different perspective) factor in the evaluation of the organization. An in-depth review of the accreditation process was made for this paper. The correlation between the aspects concerning the above-said objectives is measured.

Results and Discussion

Role of QMS Procedures in Improving the EIA

Table 1 indicates that each one of the QMS procedure has an important role to play in the preparation of EIA. Further, guidelines of each

procedure are discussed below to understand EIA relationship with ten QMS procedures-

Quality Policy

The quality policy is an indication of the goals of an organization. It is an ISO-9001(2008) requirement. The quality policy is a document to express the directive of the top management regarding the quality of services and products. The main objective of the quality policy of a company is to focus on customer satisfaction. It is prepared based on the vision of the company management for a successful business. Smith and co-workers (2014) concluded that the business performance of a company can be enhanced if its QMS includes well-quantified references for improvement.⁸ It commits continuous improvement through complying with the requirements. It provides a framework for setting objectives and the review mechanism. It also provides information about the mechanisms of communication within the organization to know how well the staff members understand each other. It is noticed that sometimes Accredited Consultant Organizations (ACOs) lack of customization of the Quality system, policies, and procedures to suit their business/sector and project requirements. It indicates the commitment of organizations towards its EIA business.

Control of Documents and Records

It is an ISO-9001(2008) requirement. Records and document preparation, maintenance, access, updating are an essential part of QMS as these are guiding tools for the team. It is an ISO 9000 requirement. Uniquely identifying documents and records is a good practice which always adds to a

good EIA and other business outputs. Always make sure that the documents are duly approved. It is the duty of the ACO that documents are reviewed from time to time and updated following the changing policies of the government/NABET. ACO has to ensure that the documents are readily available for reference and inspection. It must be ensured that the documents are properly stored and protected without affecting their quick retrieval. There must be a clear-cut procedure about the handling of an outdated or superseded document in the company. EIA reports are important documents that should be stored by ACOs for a longer period.

Performance Measurement and Review

It is necessary to maintain the quality of EIA reports and the experts involved in the task of impact assessment. Performance Measurement and Review is an ISO-9001(2008) requirement. However, NABET has also defined criteria to assess the quality of EIA reports in the Scheme. Some Key Performance Indicators (KPI) of experts involved in EIA have to be defined in the QMS. A procedure must be defined how to improve the skill and the competency level of the experts. There must be a periodic and systematic audit and related follow up for the closure of NC/Observation. The use of both internal and external audit systems can help in the growth of an organization. here is always a need for procedures used for the periodic review of management. The feedback from project proponent or public hearing or ministry on the quality of EIA reports needs to be documented with follow-up action. Also, the scheme has separate detailed criteria for the performance of experts and EIA which can be a reference for ACOs in developing their review system

Actions Taken to Address Non-Conformance

It is an ISO-9001(2008) requirement. The process of accreditation makes ACOs accountable for Non-Conformance (NC). The NCs can be generated due to serious deviations noticed during the execution of internal or external audits, public hearing, EAC/SEAC meetings, NABET assessments, customer feedback, etc. The QMS needs to address whether the procedures are defined for attending NCs and to take proper action to comply with the scheme. The procedure should be clear about granting the time frame and the responsibility for the actions. More importantly, if needed there must

be a provision to amend the existing procedure for prevention of the recurrence of such NCs. The purpose is to close all the gaps through a proper mechanism.

Identification, Retention & Assessment of Performance of Empanelled Experts

The QMS specifies the qualifications and experience requirements of the experts. The details of the work done are assessed before hiring the individual. The "terms of reference" for retention of the expert is defined in QMS. Also, the procedure for the performance assessment of the work of the expert is defined to avoid any subjectivity in the evaluation. Provision of training of experts is a good option to help the expert to updating his/her knowledge. Empanelled Experts are commonly used by almost all ACOs to fulfill some of their sector and FAs requirement hence it is important to utilize their expertise with a defined procedure.

Collection/Masurement of Primary Data

The procedure of collection and measurement of primary data is a backbone to support impact assessment. Primary data is data that is collected by a researcher from first-hand sources, using methods like surveys, interviews, or experiments. It is collected with the research project in mind, directly from primary sources (<https://www.statisticshowto.datasciencecentral.com/primary-data-secondary/> accessed on August 2nd). The collection of primary data with the required quality is essential for a project. The generation of primary data helps in setting a baseline of concentration of the parameter at the beginning of the project. It provides the status of the biological, social and economic environment in core and buffer zones of the proposed project sites because inadequate or unreliable baseline data is the common cause of poor-quality EIA. The ACO has to ensure that the data collected through the prescribed method for a recommended period. The protocols related to data collection are expected with ACOs. Also, they have to ensure that an appropriate number of field visits has been made and the number of sites is selected as per the objectives of the project. It is noticed that sometimes, some ACOs do not make a site visit with the team. This is considered as a non-compliance. Once the data are compiled, it should be interpreted to help the impact assessment. Often, data interpretation is either missing or is very

poorly attempted which leads to lower scores during the assessment by the assessors. Primary data is an essential part of the impact assessment and designing management plans.

Collation, Synthesis, and Interpretation of Secondary Data

The data which are already collected and readily available from other sources are called secondary data. It is mandatory to instruct how to collate and synthesize the secondary data to use it effectively to support the EIA report. It is a NABET requirement. Proper procedures must be described in the QMS for ascertaining the authenticity and credibility of data. There must be a procedure for identifying the relevant secondary data and their sources useful for the EIA. The steps for validating important secondary data by cross-verification at the site or from other sources ensuring their reliability and age must be mentioned. The procedures required to ensure the brevity of the data for eliminating irrelevant information from the datasets must be defined. These practices can certainly improve the quality of EIA. Most importantly, the correct secondary data with its complete originated information to be used in the reports for delivering the purpose of the report.

Work Outsourced

Sometimes, the work is outsourced by an ACO. The conditions for the outsourcing of work must be defined in the QMS along with clear-cut guidelines for assessing the capability of the agency to take up the outsourced work, drawing up the Terms of Reference (ToR) for the outsourced work. Steps to ensure the quality of the outsourced work must be defined. It is a NABET requirement. The various studies in EIA can be outsourced such as R & R plan etc. depending on the project through this procedure.

Laboratory Work for Baseline Data

It is a NABET requirement. The strength of the chemical analysis or the laboratory support needs to be assessed for which proper methods must be defined or referred to in the QMS. Procedure for assessing a laboratory for the analysis of various parameters required for baseline and regular data collection must be addressed. Also, the procedure for sample collection, preservation, and transportation from the observatory to the laboratory must be defined. A well-defined protocol for QA/QC must be documented. It must also be defined how to ensure

quality assurance related to primary data collection work.

The NABET scheme emphasizes that it must be spelled out what type of records to be maintained by the laboratory and the EIA team on the baseline data collection work. To assess the capability of engaging a laboratory for analytical work so that poor, inconsistent, contradictory or inaccurate site data is avoided. A foundation of any EIA is primary data which should be collected by an accredited or certified in-house or external laboratory under the guidance of EIA coordinator and expert.

Complaints and Appeals

The procedure for attending complaints and appeals is an essential part of QMS. It is a requirement of ISO 9001 (2008). The procedures must encourage the part of concern to file a complaint. ACO has to ensure for informing the clients about the provision of complaints and appeals. There must be a defined procedure for receiving, handling and disposal of the complaints and appeals within a reasonable time. Record of each complaint and appeal must be maintained properly. The guidelines for preventive or corrective actions must be defined. Any kind of the concerns received from all stakeholders including other consultant organizations should be maintained.

Variation of QMS Scores and EIA Scores

Relationship of QMS and EIA for the ACOs with Surveillance Assessment

The QMS and EIA scores of fifty-one organizations which have undergone SA from 2016 onwards, were considered for the calculation of correlation coefficient. Fig. 1 shows the variation of QMS and EIA scores. The independent variable is marks scored in QMS and dependent variable is EIAs. This scatters plot shows a strong positive correlation between the two. Thus, the quality of the management system and the EIA are well linked with each other. Since the EIA marks scored by ACO are due to many factors like experts' capability, field investigation, etc. hence, a good correlation of QMS marks with the EIA marks is an indicator of good implementation of QMS. The weightage of QMS is 15 % to the overall score of the organization. As a matter of fact, a sincere system-based approach generally helps an organization improve its performance on a continual basis

The implementation of QMS could be seen as an opportunity, offering the possibility of effectively managing EIA projects, enhancing cohesion between experts and ensuring technical knowledge is put to good meaningful reports. It enables to develop systematic plans and procedures that drive the EIA process for meeting the objectives (not dependent on individual experts) which lead to very consistent EIA Reports. However, in spite of QMS being a powerful framework in accredited organizations, there are other important factors for generating good quality EIAs, classified into three categories- a) Field investigation for collecting data, b) Quality of Experts, and c) Organisational Commitment. Certainly, good QMS reduces the risk of individual factor. System in place not only aids in improving the quality of reports but also high customer satisfaction along with value addition to the stakeholders. However, sometimes, team commitment and responsibility related issues prevail which affect the quality of both QMS and EIA.

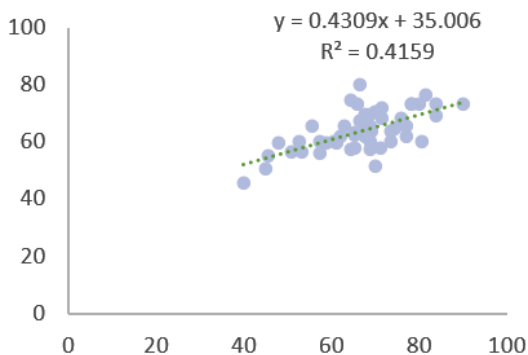


Fig. 1: The correlation between % scores of QMS and EIA

Interestingly, around 20 % of ACOs are those whose performance in EIA is better than QMS. It can be resulted due to the contribution by quality of experts, adequate identification, interpretation, and management plan in EIA reports assessed by NABET.

QMS Performance of New Organizations

Fig. 2 shows the QMS performance of 25 new organizations. As shown in Fig. 2, 80% of new organizations had effective quality systems after 18 months accreditation from NABET which streamlines the EIA consultancy business with the structured framework, however, the quality of EIAs

whether improved is not sure because did not have quantified figures to prove it.

Performance of QMS of New ACOs

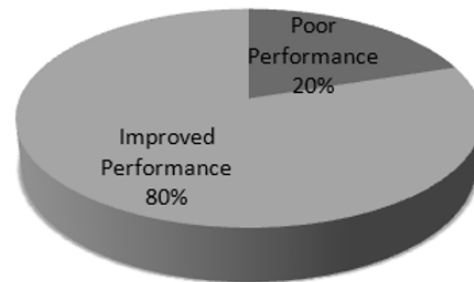


Fig. 2: Pie diagram showing QMS performance of new ACOs after accreditation

Fig. 3 shows the performance of individual new ACO after getting NABET accreditation. The system of 20% of the organizations is seen ineffective even after accreditation. ACO Nos. 4N, 22N, 23N, 24N and 25N were among poor performers. Though it is difficult to point out the exact reasons for such deviation, we assume that it may be due to less number of business assignments, inconsiderate behaviour of the organization or may be due to ineffective communication of feedback to the ACOs. Initially, the new organizations are generally not aware of the requirements of QMS. Each organization depending on its capability takes its time to understand the accreditation process requirements and meeting the objective.

EIA Performance from Re-Assessment to Surveillance Assessment

As shown in Fig. 4, 79 % of accredited organizations show the continual improvements in the quality of reports after getting accreditation from NABET as measured after completing the first cycle of accreditation. Around 21% of cases showed performance (SA2) poorer than the previous assessment (RA).

Fig. 5 shows the performance of EIA of individual ACO. ACO Nos. 2, 6, 15, 27, 29, 30, 35, 37, and 43 were among the poor exhibitors of EIA from RA to SA2 from 2016 to June 2019. It indicates the overall impact of NABET accreditation on the

Quality of EIAs. The organizations are assessed the basis of human resources, field investigations, laboratory systems, quality management system (QMS) and organizational commitment. Fig. 5 is displaying a significant positive change in the scores of Accredited ACOs. These ACO have completed one cycle of accreditation. Even though these have been accredited to NABET, there were certain common problems such as non-compliance to statutory requirements, TOR is partially or

poorly complied, Inadequate baseline data, lacking important technical details, cursory and generic identification of impacts, inadequate attention to management plans, which are faced by the majority of these organizations influencing their performance. Most of the organizations are not attempting the interpretation of data properly hence losing marks in it. Sometimes, in spite of all efforts, market conditions disappoint and affect the performance

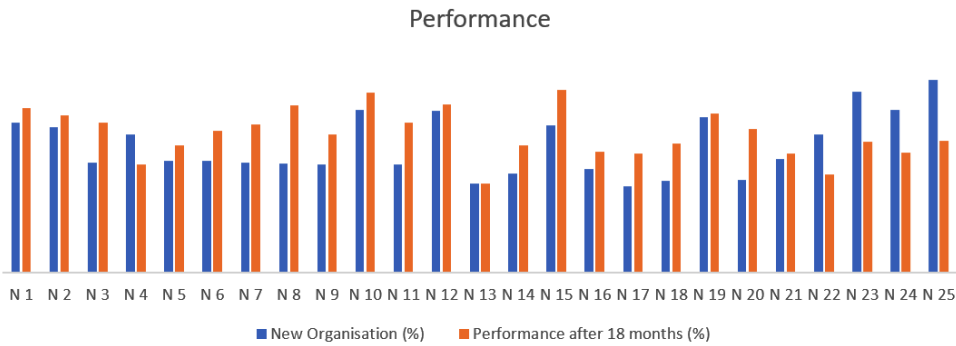


Fig. 3: Performance of QMS of the new organization and its assessment after 18 months

PERFORMANCE OF EIA FROM RA1 AND SA2

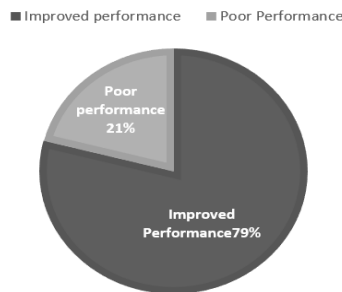


Fig. 4: ACO Performance based on Quality of EIA from RA1 to SA2

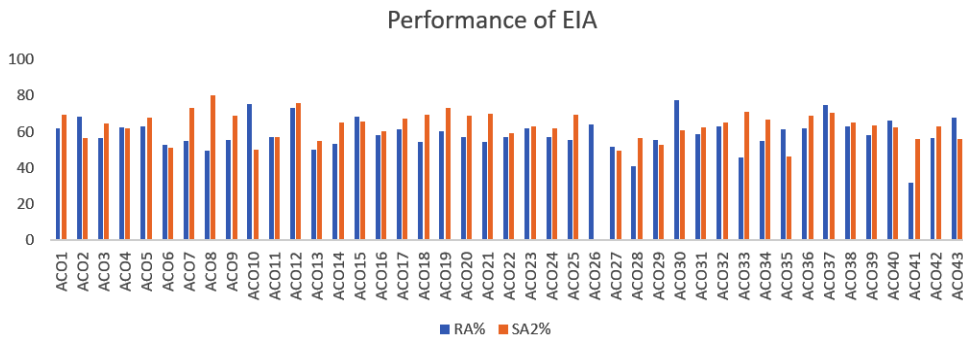


Fig. 5: Performance of EIA of Accredited Consultant Organisations during RA1 and SA2

Conclusion

It has been realized that there is a need to take QMS seriously for creating good quality of EIA reports. It is expected that the EIA report should be clear, concise, comprehensive written impartially without bias to cover each environmental topic in a way which is proportionate to its importance. The following major conclusions are drawn:

1. A quality management system (as per NABET criteria) has positive relation with EIA reports.
2. Common gaps related to QMS in an Accredited Organization classified into six categories-
 - a. lack of customization of the quality system, policies and procedures to suit their business and project requirements,
 - b. inadequate understanding of the systems,
 - c. links between procedures and project are not described,
 - d. lack of commitment and responsibility of the team and
 - e. missing efforts of continual improvement
3. Interpretation of data is often missing in the report. Therefore, it is suggested to develop a matrix or method that will enable organizations to identify, interpret and quantify impacts effectively, reduce the usage of generic statements from the reports.
4. There is a need to learn the purpose of accreditation and the art of utilizing which is missing from the intent of some ACOs.
5. Needless to say, there should be a mechanism for promoting awareness on quality management systems to help organizations for streamlining their systems.
6. This study suggests that developing a strategic framework to reach excellence in

EIA reports through developing a strategic management system for the betterment of society and environment.

7. Also, the ACOs should 'measure' internally the change in the quality of EIAs prepared by them with the implementation of QMS as recommended by the NABET accreditation.
8. This paper suggests that following should also be taken care by QMS procedures apart from the ten procedures:
 - interpretation of baseline data for identification of impacts,
 - quantification of identified impacts,
 - prescription of pragmatic EMP,
 - Post-project monitoring plan

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Conflict of Interest

The authors do not have any conflict of interest.

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