

Development Of Model for Measuring Audit Quality in Maritime Safety Management

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ABSTRACT: The effectiveness of International Safety Management (ISM) Code has been evaluated in many aspects. However, limited research has been attempted to evaluate the auditing mechanism, its quality, and links with the effectiveness of the Code. The aim of this Paper is to define the concepts of quality in auditing and thereafter propose a model for measuring audit quality in maritime safety management. The major challenge is that almost all auditing literature and research is focused on accounting and financial domain. Therefore, it was decided to utilize suitable principles and concepts about audit quality from financial domain and modify them to maritime context. As no theoretical model for Audit Quality in maritime domain is available, a model sourced from financial audits is modified for use. The framework for recontextualized modifying of borrowed theories from the disciplines outside the reference discipline, was used on Wooten (2003) model and Maritime Audit Quality Model (MAQM) has been proposed for evaluating ISM auditing mechanism.

1 INTRODUCTION

International Safety Management (ISM) Code was introduced as a global regulatory framework to address human errors and poor management practices of shipping companies. This was a major change in approaching maritime safety as IMO's earlier attempts to improve shipping safety and to prevent pollution from ships had been largely directed at improving the hardware of shipping – for example, the construction of ships and their equipment [1].

The ISM Code defines the objectives & the requirements of the Safety Management System (SMS) and the responsibilities of the company in designing and successfully implementing the SMS. Verification of compliance of all regulations on ships proceeding to sea is an important facet of the regulatory

framework of maritime safety and the flag states have been obliged to ensure this through auditing, inspections, etc., on ships flying their flags.

Chapter IX Regulation 6 of SOLAS lays down verification of the proper functioning of the ship's safety management system by the flag state or an organization recognized by the flag state [2].

The ISM Code provides an international standard for safe management and operation of ships and for pollution prevention. The Code is in two parts - Part A deals with Implementation and Part B deals with certification and verification [3]. Section 13 of the ISM Code mentions in detail about the certification and periodical verification for compliance with the provisions of the Code. The Flag State of each ship is required to conduct regular audits of the company as well as each ship operated by them, to ensure that the

shipping company and the crew onboard ship implemented the provisions of the Code.

The implementation framework and processes for verification of compliance, adopted by various national maritime administrations, constitute the ISM auditing mechanism which may be quite different from each other and could also lead to variation in the quality of the outcome.

The ISM Code was introduced to address the human factors and organizational or management influences in safe management and operations of ships thereby focusing on a systemic approach aiming to integrate verification of compliance of all technical and safety regulations through a safety management concept. Therefore, the Code aims to support and encourage the development of a safety culture within the shipping industry whilst improving compliance with the requirements of international convention [4].

1.1 *Research Question*

The paper is focused on the questions - What is the meaning of the term 'quality' in audit and how do you measure it through a theoretical model?

Thus, the aim of the paper is to identify, clarify, discuss, and define the concepts of quality, in auditing context, and thereafter examine the theoretical model for audit quality.

1.2 *Method*

The overall analytical framework applied for answering the research question is by broadly applying qualitative research strategy. The model sourced from a different discipline will be modified for use in maritime context using recontextualized theory.

2 QUALITY: CONCEPTS AND CHALLENGES

The evaluation of the ISM auditing mechanism for its quality offers two major challenges – lack of scholarly literature on auditing in safety or maritime domain and defining the term 'quality'.

2.1 *Deficiency in Auditing Literature*

A comprehensive literature search in all the major academic databases and resources reveals that almost all of the auditing literature consists of financial and accounting domain despite auditing being also quite prevalent in various other domains. Over the years, audit principles have been established for quality management system, environmental management system, food safety, information security, occupational health & safety and energy by the International Organization for Standardization (ISO) [5].

Further, audits of safety and safety management systems in various industries have been implemented as a systemic approach to improve safety. In addition,

regulatory compliance and assessment audits in public services including government departments are common for assessment and certification of delivery systems of these entities to general public. However, these fields of audits have been very sparsely researched in terms of theory, modeling, processes, quality, and effectiveness.

Similarly, the audits in maritime or shipping domain are also very sparsely researched.

An exhaustive literature search including forward, backward and sideways searches yielded very few resources. In addition, professional literature, produced and used by practitioners and operational organizations - which was not discovered in academic searches, was also traced and perused.

However, no existing principles or theories could be found in safety auditing in general, and maritime auditing in particular, for evaluation of the ISM auditing mechanism. Thus, it was decided to utilize suitable approach of relevant principles and doctrines concerning financial auditing by modifying them to maritime context. Consequently, this overall approach falls more on the exploratory side than being explanatory at this stage.

2.2 *Defining Quality*

A host of scholars attempting a literature review towards synthesizing the variety of definitions of audit quality have recognized and acknowledged the difficulty that there is no uniformly accepted definition of audit quality, despite decades of audit research. DeAngelo (1981) defines audit quality in terms of two components: the likelihood that an auditor will (1) discover a breach (i.e., an existing misstatement); and (2) appropriately report the breach, if discovered. The first component links audit quality to an auditor's competence and level of effort while the later refers to audit quality in terms of an auditor's independence and professional skepticism [6].

Some other definitions have focused narrowly on only a part of the full auditing system. Knechel, et al. [7] cite some of these definitions - while US Government Accountability Office (GAO) defines audit quality as one performed in accordance with auditing standards, Chang & Wong (2002) suggest detecting errors in reported outcomes and Peecher & Piercey (2008) define poor audit quality by identifying adverse outcomes from an audit, thus defining it in terms of failure - which could be litigation, fraud or misreporting, etc.

The evaluation of the quality of the process of the audit was also proposed as the measure of overall audit quality discounting the earlier focus on facets of auditor's characteristics of competence and independence [8]. Others define it in terms of independence and competence of auditing - higher independence & competence offer higher quality, and size & reputation of auditing organization - larger and reputed firms offer higher quality [9].

The perspectives of audit quality also vary among stakeholders. For regulators, it could be maximizing the amount of audit evidence obtained and the

challenge provided to the management of company, while for the company, it could be less cost of audit & disruptions of ongoing operations by quick completion of audit [10]. The auditors however, perceive independence, objectivity, integrity and less external constraints/ influences as factors for high audit quality [11].

However, it has been observed that most of the audit quality studies have given prominence to the definition of DeAngelo and the basic principles in this definition have been complemented either with inclusion of certain additional factors or the existing ones have been expanded or further clarified for better focus. Further, it is considered in the preliminary examination that this definition is quite generic propounding basic principle of quality of an audit in terms of finding and reporting any anomaly. It not only conforms to the aim of the audit itself but also provides for the evaluation of the overall auditing mechanism & not restricted to the process of audit. Thus, this definition can be applied in the maritime context and in the study of ISM auditing mechanism.

As the anomaly to be detected as per ISM Code, in the audits for verification, is termed as 'non-conformity', the same is proposed to be used for defining audit quality for this study. Thus, the quality of audit for maritime context is defined as 'the likelihood that an auditor will discover a non-conformity and appropriately report the non-conformity, if discovered'.

However, it may be considered that the conceptual basis of the anomalies and how they are identified in the two contexts- financial and maritime, could be slightly different. Therefore, the analogy of 'breach or misstatement' and 'non-conformity' could be considered appropriately.

3 SELECTION OF MODEL FOR MEASUREMENT OF AUDIT QUALITY

As discussed earlier, the term 'Audit' is usually associated in scholarly literature with financial auditing and other fields have been very sparsely researched in terms of audit quality. Thus, a generic model of 'Audit Quality' is not available which could be applicable or utilized to most areas or could be revised and modified for use by other fields. Further, any specific model applicable to shipping industry, where many types of audits are undertaken apart from safety management, has also not been found.

Therefore, the model for measurement of audit quality for investigation in my study is proposed to be taken from financial auditing. Numerous frameworks or models for audit quality have been proposed over the period of time, some being very basic and others very complex ones. Most of them include the overall auditing system rather than only the audit process.

The basic models include elements of reliability, availability and maintainability [12], inputs, process, and outcomes [6], objectivity & independence, integrity and constraints [11] and audit firm culture,

skills of staff, reliability, audit process and external factors [13].

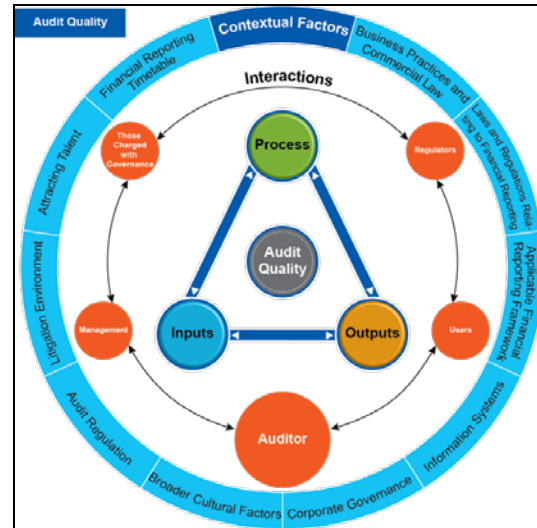


Figure 1. IAASB Audit Quality Model

Some of the more complex models include the one described by International Auditing and Assurance Standards Board (IAASB) in a voluminous document, with a host of interactions between a large number of factors and domains as depicted below [10].

Australian National Audit Office (ANAO) also uses a complex model for quality framework as depicted below [14].



Figure 2. Australian National Audit Office (ANAO) Audit Quality Model

Some of the models focus only on a particular component of the auditing system and still provide a complex framework for audit quality. For example, a complex model focusing only on auditing organizations as proposed by Vaicekauskas and Mackevičius [15] is depicted below.

Incidentally, three main perspectives have been identified related to audit quality that could add to our understanding of the concepts and factors affecting audit quality in practice - academic research, professional and regulatory [16]. Therefore, the

differences and complexities of the framework and models for audit quality could be associated to these different perspectives.

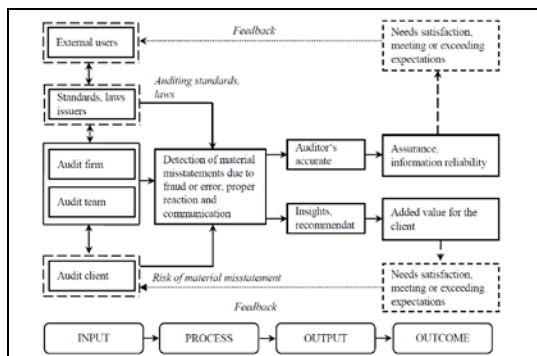


Figure 3. Audit Quality Model for auditing organization

3.1 Identification of model for maritime audits

In the light of the above discussions, a comprehensive investigation of models for measurement of audit quality was conducted and the Audit Quality model proposed by Wooten [17] for measuring audit quality of a financial audit is identified as appropriate for evaluation and application during the study. This model is based on a two-dimensional model proposed by DeAngelo in 1981 and further built on by Wooten through theory building and empirical research over the years. It is considered appropriate as it is based on elements that are quite generic, which could either directly be applied to a variety of domains or could be modified easily to suit particular fields.

There are two considerations for choosing this model for the current study. Firstly, the definition used for audit quality in the study is drawn from the basic principles postulated by DeAngelo, which is also the primary basis for this model and therefore it complements the research without any bias and distortions. Secondly, this model is considered generally suited to be adapted to maritime context as it incorporates elements similar or contextual in maritime domain. The model is depicted below:

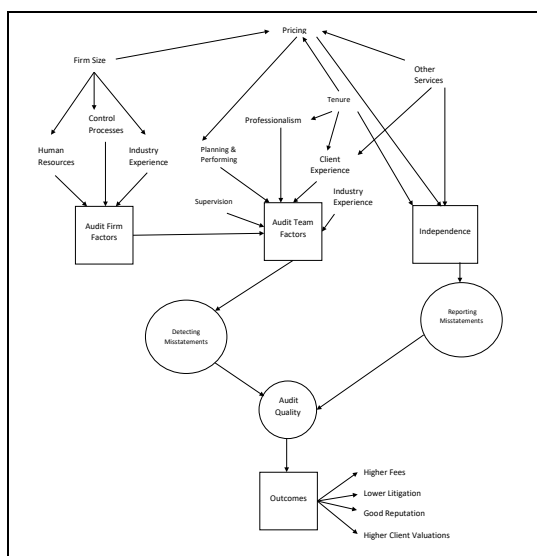


Figure 4. Wooten Audit Quality Model

The model postulates that the 'Audit Quality' is influenced by a variety of factors. However, it primarily defines two standards for addressing the issue, first, a misstatement must be detected, and second, the misstatement must be reported (based on DeAngelo definition). Further, the model attempts to define, measure and study multiple dimensions of audit quality. The factors related to detection consist of those associated with the Audit Firm and the Audit Team while those related to reporting are associated with the independence of auditors and the firm in general. It further identifies the most significant influencers to each of these three factors as depicted in the model.

4 MODIFICATION OF WOOTEN MODEL OF AUDIT QUALITY FOR MARITIME DOMAIN

Though prima facie, it is a model for measuring audit quality for financial audits, preliminary examination reveals that it is also suitable to be utilized for maritime audits. However, the nuances of the influencing factors may need to be suitably redefined to give contextual basis and contrast, though there may not be any requirement for a large-scale modification.

The framework for recontextualized modifying of borrowed theories from the disciplines outside from the reference discipline proposed by Moeini, et al. [18] is used in this study. It proposes recontextualization of the construct as well as relationships between them through specification – modifying for specific phenomena, and distinction – explaining how aspects of modified conceptualizations and relationships are unique to these phenomena. The authors have proposed this theoretical approach based on information systems (IS)- specific theory, for information technology (IT)-rich recontextualization of borrowed theories. However, it is found suitable to be adapted and used in other domains too.

4.1 Recontextualization of Constructs

The constructs in the Wooten Model have been examined and the following have been recontextualized (Table 1).

4.2 Recontextualization of Relationships

The relationships between the constructs in the Wooten Model have been examined and the following have been recontextualized (Table 2).

Based on the recontextualization of constructs and relationships, the modified version of Wooten Audit Quality model is depicted below and is designated as Maritime Audit Quality Model (MAQM) as it could also be used for audits other than maritime safety management.

Table 1.

Original Construct labels	Recontextualized construct labels	Specification	Distinction
Detecting misstatements	Detecting non-conformities	Misstatement is relevant to financial and accounting domain in the context of anomalies that are aimed to be detected in an audit. This anomaly is 'non-conformity' in maritime context.	Non-conformity is non fulfilment of a specified requirement, which is not only appropriate in regulatory audits but also the designated anomaly to be detected as per ISM Code in the audits for verification and certification.
Reporting misstatements	Reporting non-conformities	Same as above	Same as above
Audit Firm factors	Auditing organization factors	Firm is relevant to financial and accounting domain in the context of private entities conducting audits. In maritime context, there are different types of entities conducting audits- flag states themselves or ROs under authorization by flag states.	The term 'Auditing organization' is more generic and therefore better suited to exemplify all types of entities conducting audits in maritime context. The term 'Firm' flag cannot include Flag State being the government entity.
Firm Size	Auditing organization Characteristics	Same arguments for 'Firm' as above. Size embodies all characteristics of an auditing firm in financial and accounting domain. However, due to a wide variety of auditing organizations, 'Characteristics' provides a better gauge than 'Size'.	Same arguments for 'Firm' as above. Characteristics is a broad concept which includes size, type of organization, association membership, reciprocal arrangements, etc. and therefore, is more relevant in maritime context.
Pricing	Flag State	Pricing is relevant to financial and accounting domain with interrelationships on audit firm and audit team factors through various influences. However, it is not a significant factor in maritime context where such major impact is exemplified by the Flag State.	Flag state is the major factor for influencing the auditing organizations and independence of system through regulatory framework, procedural guidelines, and delegation of auditing work on their behalf. Therefore, it better represents the construct than pricing. Further, decision of shipowner to choose open or international registries to flag their vessels is also usually based on price or costs and could be correlated to the concept. The model is proposed for safety management audit and therefore, the outcome is higher safety.
Higher Fees	Higher Safety	The influences of audit quality outcomes in terms of higher fees are more relevant to financial and accounting domain. Safety as a measure of output instead of Fees is more suited to maritime domain.	The model is proposed for safety management audit and therefore, the outcome is higher safety.
Lower litigation	Lower accidents	Same as above, accidents as a measure of output instead of litigation is more suited to maritime domain	Lower accident is outcome for safety management audit.
Higher client evaluations	---	No equivalent construct found and therefore it is removed.	
---	---	New construct 'Stakeholders Factors' incorporated in model.	The maritime safety management is aimed and implemented through a broad regulatory framework in ISM Code. Hence, there are a wide variety of influences of various stakeholders e.g., the shipping company, ROs and the seafarers, on the auditing mechanism of maritime safety management. Therefore, a new construct of 'Stakeholders Factors' is incorporated in the model.
---	---	New construct 'Feedback' incorporated in model	The feedback on the auditing by the auditee - shipping company and ship's crew provide an important loop for quality. Therefore, a new construct of 'Feedback' is incorporated in the model.
Industry Experience	Industry Experience	The definition of construct is recontextualized to also include expertise.	The inherent or residual expertise is significant factor influencing any auditing organization, especially in maritime context where very small countries operate open registries with large fleet of ships.
Planning & performing	Planning & performing	The definition of construct is recontextualized to also include Auditor's perspectives.	Auditor's perspectives originating either from cultural, behavioral, or systemic causes, influences perceived relative significance of ISM objectives and affects Audit Team factors.

Table 2.

Original causal relationship	Recontextualized causal relationship	Specification	Distinction
Firm size influences 'Pricing'	In the new constructs, 'Auditing organization characteristics' and 'Flag State', the causal relationship is opposite	Flag state influences who will be the auditing organization, deciding whether to authorize any ROs, distribution of work to ROs or itself, etc.	The concept of Flag State is unique in maritime context which has the main responsibility for verification of compliance in maritime safety management.
Other multiple causal and influencing relationships of 'Pricing'	New construct 'Flag State' found to have similar relationships	Similar relationships with constructs Other Services, Independence, Planning & Performing (audit team factors) and tenure.	Other services include the classification services and statutory services provided by classification societies on behalf of flag states to shipowners, which in turn influences independence. Flag state directly influences independence, while acting as auditing organization and also through oversight mechanism of ROs work. Flag state influences planning & performing through regulations and guidelines and procedures for conducting audits. Tenure or time duration of engagement influences flag state decision for authorization of ROs
---	---	The new construct 'Stakeholders Factors' has two ways causal and influencing relationship with the construct 'Auditing organization Characteristics'	The various stakeholders influence and get influenced from auditing organizations and have a greater role in maritime context due to broad framework envisaged.
---	---	The new construct 'Feedback' is influenced by the new construct 'Stakeholders Factors'. Further, it influences the construct 'Auditing organization Factors'.	The feedback from the auditee contributes to the improvements in processes in the auditing organizations for enhancing quality.

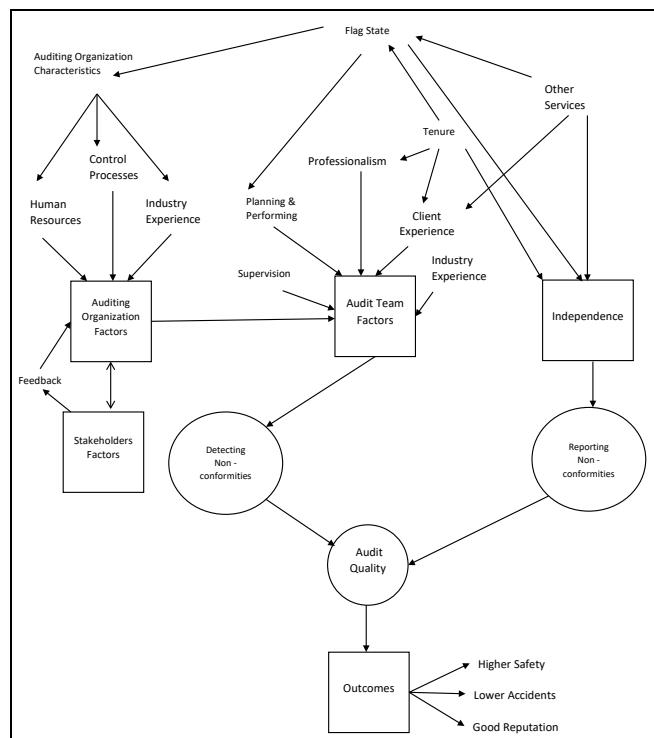


Figure 5. Maritime Audit Quality Model (MAQM)

5 CONCLUSION

The principles of safety management implemented through ISM Code in maritime domain have been evaluated in many ways by various scholars. The

importance of the verification and certification to ensure compliance of the requirements makes it prudent to evaluate the ISM auditing mechanism for its quality and effectiveness.

The major challenge in attempting this is due to the fact that almost all auditing literature and research is focused on accounting and financial domain. Though audits are used as an effective tool for a host of other domains including safety and safety management, these fields have been very sparsely researched. Therefore, it was decided to utilize suitable principles and concepts about audit quality from financial domain and modify them to maritime context.

Further, the concept of quality with respect to audits is quite complex with definitions ranging from very simple to quite complex ones.

The audit quality has been defined for this paper based on the definition of DeAngelo, as the likelihood that an auditor will discover a 'non-conformity' and appropriately report the 'non-conformity', if discovered.

As a generic model of 'Audit Quality' is not available which could be applicable or utilized to most areas or could be revised or modified for use by other fields, Audit Quality model proposed by Wooten (2003) is modified to maritime context and proposed for use. The recontextualization of the constructs as well as relationships between them was undertaken and MAQM has been proposed for evaluating ISM auditing mechanism.

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