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INFORMATION ASSURANCE QUALITY FACTORS: A COMPARISON OF MANAGER VERSUS STAFF PERSPECTIVES

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ABSTRACT

This manuscript reports preliminary results of a research project with the objective of discovering constructs and developing theory to explain and improve the information assurance process. This theory should enhance our understanding of the broad range of factors that influence information assurance and guide future research in this area. This study builds on prior research by comparing the perspectives of managers versus staff members that perform information assurance services.

Keywords: Information Technology Audit, Theory Building

INTRODUCTION

Assuring that information systems are secure and operating as designed is a critical an on-going function for all organizations. This function is particularly relevant in the context of financial statement audits for publicly traded corporations. Given the current regulatory requirements related to Sarbanes-Oxley, HIPPA, FERPA, etc. and the consequent investment by organizations in the evaluation, assessment, and audit of information technology (IT) systems; it is useful for organizations to understand the factors that influence the efficient, effective, and successful conduct of these activities. In addition, public accounting firms and publicly traded corporations in the U.S. are required to adhere to quality control standards, such as those promulgated by the Public Company Accounting Oversight Board (PCAOB), the Institute for Internal Auditors (IIA), and the American Institute of Certified Public Accountants (AICPA) when performing information systems assurance services.

Each IT audit is unique. The factors that impact the quality of an IT audit will vary based on the circumstances of the project, i.e. the industry, size of the organization, complexity of the systems involved, personnel, etc. In order to understand the impact of these factors on information assurance activities, we must first identify and define them. Therefore, it is useful to identify a comprehensive set of factors that are considered important for performing information assurance services. Also, it seems prudent that the best source of these factors would be from the professionals that perform this work, i.e. by the auditors and audit managers. Further, once a set of factors is identified we can then theorize upon the relationships between these factors and their impact on information assurance activities. These constructs and their relationships can then inform a theory of the information assurance process that can be further tested and refined. Additionally, for the practitioner, the identification of a comprehensive set of factors that influence information assurance quality can provide guidance for planning and managing these audits. These factors may act as important antecedents to audit activities that could be managed or organized differently to positively influence the outcome of a specific activity.

RESEARCH APPROACH

The research approach is based on procedures and philosophical underpinnings for theory development from management theory building literature, including the grounded theory (GT) literature. The study was performed from an interpretive theory development perspective using a structured group process as the data gathering technique and the constant comparison data analysis approach used in grounded theory development (Eisenhardt and Graebner 2007; Eisenhardt 1989; Glaser and Strauss 1967; Rowlands 2005; Strauss and Corbin 1998; Fernandez 2004; Allan 2003). The Grounded Theory Method (GTM) was proposed as a systematic methodology for deriving theories of human behavior from empirical data (Glaser and Strauss 1967).

GTM inherently takes an interpretive research perspective. It is a method of describing, interpreting, and analyzing the social world from the participant's perspective (Glaser and Strauss 1967; Orlikowski and Baroudi 1991; Urquhart 2002). This participant-oriented perspective is embodied within the purpose and outcomes of the nominal group technique for data collection (Delbecq et al. 1975; Van de Ven and Delbecq 1974; Van de Ven and Delbecq 1971), especially when used for interpretive "outside research" (Walsham 1995; Walsham 2006).

Outside research is defined by Walsham as research conducted with no direct involvement in action in the field or in providing significant feedback to field participants. An underlying assumption of the nominal group technique is that individuals who perform a task can provide valuable insight into the important factors influencing their ability to achieve a high level of productivity when performing the task. This method has been used successfully in several domains including systems development and auditing (Duggan 2003; Duggan and Thachenkary 2004; Havelka 2002, 2003; Havelka et al. 1998; Sutton 1993; Sutton et al. 1998; Sutton and Lampe 1989, 1991; Havelka et al. 2001; Sutton et al. 2008).

Table 1. Nominal Group Technique Used

Step 1:	The facilitator made general introductions of the participants, explained the purpose of the study and the meeting, gave some definitions to be used by the subjects, explained the nominal group process to be performed, and introduced the question to be answered by the subjects. A definition of IT audit was given and the question presented to the groups was stated as: "**What factors do you believe influence the efficiency, effectiveness, and quality of the IT audit process?**"
Step 2:	Each subject was then asked to silently generate as many of these factors as possible.
Step 3:	After 15 minutes the facilitator began to write the indicators on a white board or flip charts for all the participants to view. The factors were elicited from the participants in a round-robin fashion until all the participants' factors had been listed. Only questions related to clarifying the indicators being listed were allowed at this point and no discussion of the merits or importance of the indicators was allowed. The participants were encouraged to add to their lists as this step progressed.
Step 4:	After all of the factors were listed, discussion of the factors for clarification of the items and distinction from one another was allowed. Again, discussion of the relative merits or importance of the indicators was discouraged.
Step 5:	Each participant was then asked to identify (on a worksheet) those factors generated by the group that they considered "critical" to IT audit quality.
Step 6:	The participants are then asked to rank the factors that they identified in step 5 from most to least important.
Step 7:	The participants were also asked to fill out a questionnaire for demographic data and when possible the participants are invited to an informal venue for further debriefing and discussion.

Other business researchers have used the Delphi group technique (Kasi et al. 2008; Schmidt et al. 2001; De Haes and Van Grembergen 2008) to perform exploratory studies or to gather preliminary data for further testing. Nominal group techniques have been found to be superior to personal interviews and surveys when the desired goal is the generation of a maximum number of ideas or alternatives (Delbecq et al. 1982; Van de Ven and Delbecq 1974; Van de Ven and Delbecq 1971). Recently, researchers in other fields have recognized the benefits in using group oriented data collection to develop theory (Lindsay and Hubley 2006). Following this promising approach to data collection for theory development, the nominal group technique (Delbecq et al. 1975) was used in the current study for data collection in conjunction with the coding and "constant comparative" data analysis method used in grounded theory development (Fernandez 2004; Allan 2003) to develop a theory of the information technology audit process. The step-by-step details of the nominal group technique used are presented in Table 1.

Two groups were used to gather data, both from one of the "Big Four" public accounting firms. The first group consisted of four information assurance managers. Demographic information for the manager participants is presented in Table 2. In addition to the demographic data presented, all of the participants indicated that they regularly used a proprietary computer-aided audit tool and other software to assist audit efforts. They each also indicated that they had worked on more than 50 separate IT audits over their careers (from 50+ to ~400). Based on

the participants' experience and education, it seems reasonable to assume that the data provided from this group would provide a good preliminary set of IT audit process constructs.

Table 2. Management Group Demographics

Participant	**1**	**2**	**3**	**4**	**AVG**
Age (AVG = 33.25)	39	34	31	29	33.25
Gender	M	M	M	M	
Your current position/title:	Sr. Mgr.	Sr. Mgr	Sr. Mgr	Manager	
Length of time in current position:	8 total, 4 as Sr. Mgr	8 yrs in auditing, 1 as Sr. Mgr	No response	1 yr	
Educational background (Degrees, Majors, Minors, etc.):	BSBA - Finance MBA - Finance	BA Finance	No response	BA Business Admin.	
Years of audit experience: (years) (AVG = 8.85)	10	~10	9	6.5	8.85
IT audit experience: (years) (AVG = 7.5)	6.5	~8	9	6.5	7.45
Any other related work experience?	3 yrs corp acct; 3 yrs systems consulting	Sales Audit	Financial audit	No	

The second group was composed of six relatively new information assurance professionals. There demographic data is presented in Table 3. This group also indicated that they regularly used software tools to support their work and that they had been performing information assurance activities for at least one year. This group represents individuals that are currently focused on information assurance tasks day in and day out. Their perspective is important because they should be most aware of the challenges of performing the work. By comparing their perspective to that of the managers, we hope to capture a different set (level) of constructs. In addition, it is useful to compare the results of the manager group with the staff group to identify differences that may be due to knowledge gained from experience that may help us improve the training and learning of new professionals in this area.

Table 3. Staff Group Demographics

Participant	**1**	**2**	**3**	**4**	**5**	**6**	**AVG**
Age	24	23	23	25	24	27	24.3
Gender	M	M	F	M	F	M	
Your current position/title:	Staff	Staff	Staff	Staff	Staff	Staff	
Length of time in current position:	24	12	24	24	12	18	19
Educational background (Degrees, Majors, Minors, etc.):	BA German BSBA Logistics/MIS	BS MIS/MKT	BA MIS/FIN	BA Business	BS ACC MBA	BA MIS	
Years of audit experience: (years)	24	12	24	24	18	18	20
Amount of IT audit experience: (years/months)	24	12	24	24	12	18	19
Any other related work experience?	Project Manager (3m), Logistics Consulting	IT Help Desk, IT Computer Consultant	Internships: Mfg, Consulting	No	Finance Ops (12m)	IT Consulting (3.5y)	

The data analysis approach used is a modified version of the Glaserian Grounded Theory (GT) approach as described by Fernandez and Allen applied to data gathered using the nominal group technique (Allan 2003; Fernandez 2004; Glaser 1978). The approach used is an iterative process that is presented in Table 4. It should be

noted that this manuscript only reports on the initial data gathering event and the results are the beginning "bricks" or foundation of the information assurance theory being developed.

Table 4. Analysis Approach (based on Grounded Theory)

Step 1: Theoretical sampling. The structured group process (the data gathering step) is the "theoretical sampling" step and is performed as the initial step. The output of the group session is a set of items that the group identified as having influence on IT audit process quality. Each of these items is an "incident" or the atomic unit of analysis for the coding process.
Step 2: Open coding. Specific incidents or "key points" are identified. The items generated by the group were coded one-by-one as separate incidents.
Step 3: Theoretical coding. Recognition of concepts or "concept emergence" occurs. Incidents are indicators of concepts (Fernandez 2004). Once the incidents from the group are codified they are then analyzed and compared to one another and those that relate to a common theme or that address the same semantic notion are grouped together to form a higher level abstraction, i.e. a concept. These concepts are then compared and contrasted with one another, i.e. constant comparative method, to form a higher level abstraction referred to as a category. Simultaneously, tentative relationships (potential propositions or hypotheses) between these categories are developed.
Step 4: Selective coding. Paring down or delimiting the theory being developed by identifying core categories to guide the on-going analysis. As the analysis progresses some concepts, categories, and relationships are strengthened. Other codes or concepts that are not supported by the analysis may be dropped or de-emphasized.
Step 5: Achieving saturation. The final step in the iterative grounded theory process is to substantiate the theory. To achieve this step, the researcher can look to the literature as a source of additional data (and to support the theory being proposed). As categories and relationships emerge, the extant literature can be used to inform and bolster the theoretical propositions being suggested.

RESULTS

The output of the data gathering produced a total of 75 unique incidents identified. The staff group yielded a total of 48 incidents identified with 39 of these selected as critical (9 not critical). The manager group produced a total of 37 incidents with 28 selected as critical (9 not). The codes, concepts, and categories that emerge from this analysis are presented in Table 5. The codes that were not selected as critical were dropped from the analysis during selective coding based on the evaluation step of the structured group process (the incidents were not considered critical by any of the group members). The analysis process revealed three broad categories of Information Assurance Factors: Individual, Management, and Environment. The Individual category included five concepts: Interpersonal Skills, Business Knowledge, Audit Skills, Attitude, and Preparation. The Management category was associated with six concepts: Communication, Supervision, Resource Management, Methodology, Planning, and Quality Control. The Environment category consisted of four concepts: Client Attitude, Client Readiness, Resource Availability, and Business Environment. These categories and concepts are described in greater detail and observations regarding the differences in management versus staff perspective are presented below.

The Individual Category

The Individual category is defined by characteristics of the individual professionals performing the assurance activities. This includes both the information assurance staff and management personnel, but not the personnel of the client or business users. In this category, both the staff and manager groups identified at least one indicator for each of the concepts. The Interpersonal Skills concept includes communication and the ability to interact with client personnel and other team members. The Business Knowledge concept represents the audit personnel's understanding of the business processes being analyzed. This knowledge is obtained through formal education and training or through work experience. The third concept to emerge in this category was Audit Skill. This refers to the audit personnel's ability to perform tasks and exercise professional judgment as auditors. Again, these skills may be

attained by formal education and training or through work experience. The concept Attitude indicates that personnel conducting the services need to be adequately motivated and understand the value of performing the services. The last concept, Preparation, reflects the need for the personnel to be adequately trained and the value of having prior experience.

Table 5.1 Concepts and Codes "Individual" Category

Concept	Management	Staff
Interpersonal Skills	Auditors' communication skills (both conveying and receiving) (1Y) Ability to ask the right type of questions (1AG) Auditor's ability to articulate findings and exceptions in a way that the auditee or other stakeholders understand (1T)	Auditors interpersonal skills (2AB)
Business Knowledge	Knowledge and competence toward the subject matter (by the auditors) (1AB)	Knowledge of client's business and market (2AG) Accurate understanding of the client's environment (e.g., knowledge of technology changes) (2AH)
Audit Skills	Practicing appropriate professional skepticism (1AI)	Auditors ability to test the appropriate level without over-testing or over-analyzing (2V) Auditors ability to learn quickly and think intuitively (2AS) Understanding of audit process (2AT) Understanding of financial audit process (2AT)
Attitude	Perception by auditors of the value of services being provided (1AA)	Motivation of auditors (2AI1)
Preparation	Experience of the audit team with the specific client (1F)	Years of experience (2A) Type of experience - exposure to technologies, serving clients, and industry (2G) Training for audit (2J)

The differences between the manager group and the staff group in this category is the number of incidents generated in the Interpersonal Skills, Audit Skills, and Preparation. For Interpersonal Skills, the management group identified and selected three incidents whereas the staff only identified one. This may indicate that managers value and understand the importance of the interactions with the client/business users more than the staff. For the Audit Skills and Preparation concepts, the staff group identified more item than the managers. This may reflect the staff's focus on being able to perform the specific tasks assigned to them and the managers' assumptions that these concepts are "given."

The Management Category

The second category identified from the analysis is labeled Management. This category contains factors which are related to tasks and activities performed to manage the assurance services (rather than properties of the management team itself). This is analogous to project management activities for other types of projects. Within the Management category six concepts emerged: Communication, Supervision, Resource Management, Methodology, Planning, and Quality Control.

Communication refers to oral, written, or electronic messages exchanged within the audit team and with auditee personnel. Communication is used to plan, execute tasks, gather information, and report results. Communication could be measured by several dimensions: timing, tone, format, frequency, etc. that may have an impact on the value or quality of the communications. Supervision reflects the need for management oversight and guidance during audit activities. The level, type, and degree of supervision should depend on the audit circumstances and could be measured in various ways, e.g. frequency of work paper review. Resource Management refers to the allocation of limited resources, especially auditor person-hours and staff level assigned (new hire v. senior staff), to a specific audit. This would also include availability of software tools, computer time, or other scarce resources that must be budgeted and accounted for.

Table 5.2 Concepts and Codes for "Management" Category

Communication	Continuous coordination and communication (both internal and external) (1AF) Appropriate tone and frame of message (1AK) Observation and findings are presented to articulate risk to client (1AH)	Communication level - client and team, staff and management (2E) Management of client expectations (2M)
Supervision	Level of audit management oversight (1AE)	Level of mentoring (professional development) (2N)
Resource Management	Appropriate amount of time is available (auditor's) (1I) Level of staff appropriateness for the needs of the client and the engagement (1N) Involving the right specialists in consulting mode or to execute fieldwork (1AJ) Leveraging of tools - data analysis tools - aligning the appropriate tools for type of audit (1G)	Time management (2K) Flexibility of personnel on audit team (2T) Resource management (admin personnel, travel planning) (2U) Return of audit personnel (2Y) Recurrence of auditor or engagement over years (2Z) Specialist auditors and technologies availability (2AE) Ability within team to provide real-time constructive feedback for each other, e.g., sharing personal experiences and "on the job training,"effective formal and informal feedback (2AM) Level of team chemistry (2AV)
Methodology	Having a methodology to follow (1X) Processes in place to manage the evolution of the deliverables (1S)	Change of scope (2L) Effective audit methodology (2P)
Planning	Establishing expectations with all stakeholders (1D) Audit scope is well-defined, communicated, and understood (1C) Deliverables clearly defined (1R)	Accurately defining scope if intended - financial and ITA (2D) Planning (2F) Allow client to prepare for audit (time for requests) (2W)
Quality Control	Level of quality control component to the project (1W) Audit findings that are relevant, actionable, and practical (1U)	

Methodology refers to the existence and use of a standard approach for conducting assurance services. Most of the public accounting firms have their own proprietary audit methodology that follows a series or sequence of phases composed of tasks and activities that also includes standardized checklists, reports, and other documents. The

methodology may also include, or be based on, a specific software package that is used to support and enable activities and to gather and maintain evidence of the work performed (including status). The dimensions of methodology that may of most interest, as most firms have a methodology to be used, is to what degree the methodology is followed and how well the methodology meets the needs of the personnel performing the services.

Planning includes the activities required to define the scope of work to be performed, outcomes to be achieved, and timing and format of service deliverables. This should include appropriate sign-offs by the service providers and by the client and any other interested stakeholder (for definition purposes the client is the actor or entity that is paying for the services and to whom the assurance professional reports, the auditee/business manager is the manager, unit or group, that is responsible for the area for whom services are performed and who the assurance professionals interact with during the engagement). Planning may also include initial preparation of budgets and schedules and the assignment of individuals to tasks (and is thus related to Resource Management above).

The final concept constituting the Management category is Quality Control. This concept represents the existence of quality control activities for the service activities and the evaluation of these activities. As mentioned in the introduction, all of the public accounting firms in the U.S. are required to maintain quality control standards. The dimensions of this concept then run along the lines of approaches used, types of techniques used, or internal and external evaluations of the techniques being used (and their output). A distinction should be made between the concept quality control and the concept of information assurance quality, the first should be an input into the second; i.e. we would expect a positive causal relationship between quality control activities and the quality of the service performed.

The difference in responses of staff and management groups is the complete lack of items being identified by the staff group for the quality control concept. This is most likely due to the fact that quality control tasks are the responsibility of more senior personnel, so the staff personnel may not even be aware of these activities until later in their careers.

The Environment Category

The final category identified from the analysis is the Environment. As defined here, it includes four concepts: Client Attitude, Client Readiness, Resource Availability, and Business Environment. The Client Attitude concept captures the general attitudes of the client/auditee/business users toward the work being performed. This would include general positive or negative feelings about the work being performed and its value. Client Attitude could be captured along several dimensions. A general measure of the perceptions of the value of the audit, perceptions of the competence of the assurance staff, the usefulness of the system or process under study could all give some indication of the general attitude of the client. More specific phenomena might also be used as indicators of the client's attitude, such as how quickly calls are returned or information is provided or whether controls are in place and being followed.

The Client Readiness concept reflects the 'posture' or 'status' of the client and the process or system under study. This could include the existence of controls or process documentation as well as the client's level of understanding of the process or system being audited. Several dimensions of Readiness may be identified, e.g. the existence or amount of documentation, the quality of this documentation, how easy it is to access this documentation. The Resource Availability concept refers to resources available from the client. This would primarily include the time available from critical business personnel, but could also include the availability of other resources such as computer time or software, and internal support personnel (internal audit or IT services) to perform specific tasks or provide information.

The final concept is the Business Environment. The items identified for this concept were provided solely by the staff group, which is an interesting phenomena. The concept refers to the level of regulation and compliance related to the client's operations. The fact that some industries are required to control and document their processes and operations may make the assurance activities easier, as many of the tasks have already been performed and documented by the client personnel. The fact that the staff group identified this concept while the management group did not is surprising. It would be expected that the management group would be well aware of this relationship between regulation/compliance and the assurance work that needs performed. Perhaps, this is an

example of the management group assuming this is the case and, therefore, not including it as a critical factor. Further research is needed to shed light on this outcome.

Table 5.3 Concepts and Codes for "Environment" Category

Client Attitude	Credibility of auditor in eyes of auditee (1Q) Perception and understanding of the value of the audit by the auditee (1H) "Tone at the top" - management's attitude toward controls (1AD) Establishing an environment that both the auditee and auditor feel is open and honest (1V) Duration of the relationship with auditee organization (1B) Appropriate management level support at the client (1A)	Client's attitude, culture, approach to audit (2C) Tone at the top of the client (2AC) Motivation of auditees (2AI2)
Client Readiness	Auditee understanding of their own internal processes and technologies being audited (1M) Client's understanding of the audit process (1L) Level of preparedness of auditee (1E) Consistency of the activities being audited year-to-year (1P) Level of controls focus of the client (1AC)	Client's understanding of audit process (2B) Complexity of IT environment (2H) Client's retention of personnel (2O) Maturity of control environment (2Q) Level of documentation of controls (2R) Level of computer system error - client or auditor (2S) Degree of avoiding controls by client (2X) Ability to rely on use of other auditors' work (easy, internal audit) (2AA) Use of vendors or outsourcing by client (2AF) Auditee's level of education and level in organization (2AK) Client's technology - packaged software vs. home grown (2AN)
Resource Availability	Availability and timeliness of supporting evidence from auditee (1O) Allowance by auditee of appropriate amount of time (1J) Availability of the auditee (1Z) Availability and quality of prior years' work papers (1K)	Availability of tools (auditor and client) (2I) Use of high-level monitoring controls, provide comfort with less talking (2AJ) Time budget allowance and constraints (2AL) Client's responsiveness, e.g., timely response (2AO) Available knowledge bases (2AP) Utilization of prior year work papers and documentation (2AQ)
Business Environment		Current governmental and regulatory environment, e.g. sound standards might be able to put more reliance on auditee (2AD) Riskiness of client's environment (2AR)

CONCLUSION & FUTURE RESEARCH

Based on data gathered from two groups of experienced IT audit professionals, staff auditors and managers. An analysis of this data revealed a set of 15 factors that impact IT assurance. These factors were grouped into three logical categories: 1) Individual, 2) Management, and 3) Environment. Comparing the staff and manager groups indicate that there are some aspects the IT process where there is agreement and there are some factors where the perspectives differ. In general (simply using the number of items identified), the management group recognizes the

value of *interpersonal skills, communication, the client's attitude, and quality control* more than the staff group. Taken together, this makes sense as the management group is responsible for hiring and assigning staff to audits, managing the process and the relationships with the client, and ensuring that the audit is performed adequately. The *quality control* factors is of particular interest as the staff group did not identify any items related to this factor. This may indicate the need to educate staff regarding the importance of these activities.

In contrast, the staff group identified more items associated with *audit skills, preparation, resource management, client readiness, and the business environment* than did the management group. Again, there appears to be a common thread among these factors: they all tend to focus on performing the day to day tasks required. The notable exception, and most interesting phenomena, is the inclusion of the *business environment* in this set. It seems more logical that the management group would be more "aware" of this factor versus the staff; however, the management group did not suggest a single item in this area. One explanation of the awareness by the staff is that they are tasked with performing specific tasks to ensure compliance with specific regulations, i.e. PCI for credit card processing. Regarding the factors where the manager group and the staff group appear to agree, both groups included several items related to *planning* and *resource availability*. This would suggest that these factors are important to both groups and therefore probably important to IT quality overall.

Viewing the results in a different way provides some evidence regarding the overall importance of each category and each factor. If we look at the total number of items generated by both groups for each category, this would suggest that the *Environment* category is the most important area to focus on to achieve IT audit quality, followed closely by *Management*. The participants identified a total of 37 items for this category, compared to 31 in Management and 18 in the *Individual.* This result may be significant with regard to IT audit planning. Of all the factors identified, the factors in the *Environment* category are the ones that may be "fixed" or "given" for a specific audit; or to a lesser degree, these factors may be most difficult to change or manipulate to gain improvements. For example is probably not possible to improve the auditee's understanding of the audit process in a substantial way for a given audit.

Clearly, further evaluation, explication, development, and testing of the findings in this study is necessary. Relationships among the categories and concepts identified need to be explored and substantiated with further data. This paper only presents the results of the initial data gathering step of the grounded theory process. The next step would be to gather more data to "flesh out" the categories and concepts identified and then validate each construct.

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