# Empirical Assessment of Effective E-Commerce Audit Judgment


## *Abstract*

This global survey of 203 B2B E-Commerce auditors examined a model of E-Commerce audit effectiveness using the methods drawn from the information technology auditing and information systems research domain. The findings support the positive and significant relationship of information technology audit expertise and information and communication technology expertise on E-Commerce audit judgment while the system change management impact was indirect via information technology audit expertise. The results of this empirical study furthers our understanding of the role of an accountant in e-commerce audit engagement and the importance of auditor expertise in systems and network change management which has been an under researched area in E-Commerce auditing. The highly technology-centric nature of E-Commerce requires various expertise areas for the E-Commerce auditor to develop a higher level of audit judgment expertise. The most significant contribution made by this study to the accounting literature is the empirical validation of the theoretical observations and the professional opinions on the need of boundary spanning role played by accountants in the e-commerce audit engagements. E-Commerce audit judgment expertise model presented here uses global sampling of forty six countries with financial, information systems and operational auditor respondents. Further, this study provides measurement scales for future empirical studies to not only confirm these scales on independent samples but also to extend the

theory developed and tested in this paper. It is hoped that the results of this study can provide a sound theoretical and operational basis for research focused on differentiating the efficacy of varying E-Commerce audit judgment expertise configurations and for future accounting studies that determine the paths of audit expertise system design and redesign for our fast changing technological milieu.

Key Words**: E-Commerce Audit Judgment, System & Network Change Management, Information Technology Audit, Confirmatory Factor Analysis, Maximum Likelihood Estimations, Structural Equations Modeling**

# Empirical Assessment of Effective E-Commerce Audit Judgment

## I. Introduction

Projections are mixed regarding the growth of E-Commerce but the most conservative projections are for slow, steady growth (Weaver, Vetter, Whinston, and Swigger, 2000). Raghunathan and Raghunathan (1994) discussed the complexity of skills needed in auditing of E-commerce entities [1] where knowledge of systems, networks, and data bases are needed in addition to accounting based skills (Colbert, 1989). Prior to the onslaught of E-commerce, Bedard and Chi (1993) wrote,

> **"Our knowledge about expertise in auditing is very limited. More research on expertise is then needed….because each client has specific characteristics and each industry requires different domain knowledge, an important characteristic of an auditor's expertise may be the ability to transfer his or her expertise when working in a new domain." p. 35**

This call for new intellectual capital for auditors is even more important today in the Business to Business (B2B) E-commerce audit context (Subramaniam and Youndt, 2005). Since the B2B context spans organizational boundaries linking firms through their collaborative work processes and interlinking transactions, audit based intellectual capital for B2B transactions entails not only knowledge of financial transactions and processes; but also the technologies that enable these processes and transactions to occur in the B2B context. Auditors with the requisite intellectual capital will be more effective[2] in B2B

audit. Inherently, B2B e-commerce is partner oriented so that B2B processes and transactions are intertwined with the business processes necessitating a special set of audit skills and expertise (Abdolmohammadi and Shanteau, 1992) to audit the B2B partners' linked business processes. As Haytko (2004, p. 312) states, "the role of boundary-spanning individuals in business alliances and relationships is virtually unexplored." This paper effectually assesses the intellectual capital attributes critical to B2B audit success in the form of various independent constructs.

While B2B auditors in their boundary spanning roles continue to need the requisite skills in accounting, finance, and business processes, they also need to be skilled at auditing information technology systems that link the B2B firms in their business transactions. Thus the auditor for E-Commerce based auditing must add another layer to his/her requisite intellectual capital – the B2B technology knowledge layer. This knowledge of B2B technologies and how to audit using these technologies is critical for the auditors to insure the integrity of their audit findings.

**--- Insert Figure 1 Auditor Intellectual Capital about here**

The remainder of this paper is organized in four sections. In the second section the theory and explanations behind the development of the propositions are presented. In the third section is presented the theoretically observed constructs, the rationale for selecting the manifest variables of individual constructs, and construct operationalization. The fourth section discusses the method of survey, respondents, and empirically evaluates the validity, reliability and the properties of the alternative measurement

models. The fifth and concluding section formally assesses the structure of interrelationships among the latent variables and the efficacy of structural path model in terms of the paper's propositions and explains the limitations, implications and future research directions.

## II. Theoretical Framework & Hypothesis Development

This paper draws heavily on the theory of expert competence of Shanteau (1992) where expertise is described as based on the following five factors: domain knowledge, psychological traits, cognitive skills, decision strategies, and task characteristics. These factors provide for the expert a mnemonic for recall and a convenient way to organize vast amounts of information (Schank, 1990). As such, these factors of expert competence (Libby and Tan, 1994) are consistent with efforts to build expert systems through "case-based reasoning" (Kolodner, 1984) where it has been shown that an adequate grasp of domain knowledge is a prerequisite for being an expert (Bamber, 1983; Bedard, 1989). This domain knowledge is inclusive of textbook knowledge, insights gained from practical problem solving experience, and stories and anecdotes from business cases (Shanteau, 1987). The theoretical basis for the research model shown in Figure 2 for B2B audit expertise is centered on expertise competence in terms of Information and Communication Technology Expertise (ICTE), Information Technology Audit Expertise (ITAE), System Change Management Expertise (SCME), and E-Commerce Audit Judgment Expertise (ECAJE) (Shanteau; 1987) .

## Information and Communication Technology Expertise (ICTE)

The facets of auditing risk and control have been radically altered in the audit context of E-Commerce firms (Jamal, Maier, and Sunder, 2003). In auditing these inter-organizational E-commerce contexts along with the demands of Sarbanes-Oxley and the privacy demands of legislation such as the Health Insurance Portability and Accountability Act, auditors need a solid Information Technology (IT) and business process re-engineering background (Abrahami, 2005). The auditing context has been extended from electronic financial records to electronic based media such as e-mail and chat messaging (Volonio, 2003). Auditor's need to be able to evaluate network applications (Hansen and Hill, 1989) since the electronic exchange of data between firms may result in the absence of source documents, the transaction may be initiated by a trading partner and there may be a bridging application between the two firms that generates transactions. Auditors need to be versed in assessing the level of E-Commerce trust in terms of security risks, privacy issues, and lack of reliability in E-Commerce processes / transactions (Patton and Josang, 2004). Further, as Best, Mohay, and Anderson (2004) indicated the nature of audit work has become in many cases continuous and computer based in nature where knowledge based systems may be used in audit assurance to detect anomalies in computer access to computer based transactions. Messier, Eilifsen, and Austen (2004) showed that auditors who were reluctant to review and audit IT controls in their audits were more likely to produce incomplete reports with undetected misstatements in the financials. Highlighting the importance of auditor knowledge of Information and Computer Technology (ICT), Grabski, Reneau, and West (1987) showed that it is important for auditors to be involved in the design of information

systems to prevent control weaknesses. Further complicating the nature of these audits, auditors need to conduct audits of B2B both in terms of the firm and in terms of the B2B industry space (Reimers, Li, and Chen, 2004). Thus it is proposed that those auditors with greater Information and Communication Technology Expertise (ICTE) will display more E-Commerce audit judgment expertise in their audit work.

**H1: ICTE → ECAJE: Information and Communication Technology Expertise (ICTE) has a positive, significant contribution on E-Commerce Audit Judgment Expertise (ECAJE) in successful E-Commerce audits**.

Increasingly audits are computer based and may be conducted via networked technologies. Brazel, Agoglia, and Hatfield (2002) showed that there are differences in auditors conducting face to face audits versus electronic review groups. The face to face auditors conducted more appropriate audits whereas the auditors who conducted the distance audits needed more training and experience in distance based auditing to make better use of these technologies in effective audits. Smith and Kida (1991) showed that auditors developed through training and experience audit heuristics which can be very helpful in audit work. Brazel's (2005) study of enterprise resource planning (ERP) systems expertise showed that auditors' ERP systems expertise is not just a result of their audit experience but also of their training in technology systems implying a need for technology auditor training in E-Commerce audits to enable the auditor to develop heuristics for computer based auditing.

**H2: ICTE → ITAE: Information and Communication Technology Expertise (ICTE) has a positive, significant contribution on Information Technology Audit Expertise (ITAE) in successful e-commerce audits.**

## System Change Management Expertise (SCME)

Haytko (2004) noted the paucity of research regarding the boundary spanning role of B2B auditors in audits of B2B transactions where audit oversight involves transactions between the Ecommerce firm and firms in its value chain both on the demand and supply side (Porter, 1980 ). Markus and Benjamin (1996) observed that boundary spanners are also agents of change and for auditors to be effective in their audits they must also garner credibility to their audit role where their assessments may well involve fundamental systems changes for the audited firms (Lamberton, Fedorowicz, and Roohani, 2005) where the auditors assess the authenticity, integrity, and non-repudiation of the B2B electronic commerce (Kogan, Sudit, and Vasarhelyi, 1999). As Grabski, Reneau, and West (1987) showed, the involvement of auditors in the design of information systems to prevent control weaknesses is needed, especially in the B2B context. Thus these B2B auditors need to understand the work processes at the intra-firm and inter-firm levels (Ballou, Earley, and Rich, 2004), and as Wright and Wright (2002) noted auditors continue to insure the separation of duties in the inter-firm context. System and network change control and management expertise as expected from any Ecommerce auditor are addressed in COBIT[3].

These control objectives along with IT knowledge add needed layers of intellectual capital to the conventional auditor's repertoire in performance of their B2B

boundary spanning roles for audit clients to insure that the technology based audits are successful. Thus B2B auditors in their boundary spanning role act as agents of change and need to be involved in the design of the inter-firm systems to insure that system and network change controls and management are integrated into the design. It is proposed that the auditor with more IT systems expertise will be more involved in change management of these B2B systems and that these auditors with network change management expertise will have more IT expertise in performing audits while this IT audit expertise will contribute ultimately to the quality of E-Commerce audit. Thus the system change management expertise will add to the auditors IT audit expertise and then have a direct and indirect effect on the quality of the E-Commerce audits.

**ICTE → SCME: Information and Communication Technology Expertise has a positive, significant contribution on System Change Management Expertise in successful E-Commerce audits.**

**SCME → ITAE: System Change Management Expertise (SCMR) has a positive, significant impact on Information Technology Audit Expertise (ITAE) in successful E-Commerce audits.**

**SCME → ECAJE: System Change Management Expertise (SCME) has a positive, significant impact on E-commerce Audit Judgment Expertise (ECAJE) in successful E-Commerce audits.**

## IT Audit Expertise (ITAE)

Research has shown that knowledge is an important determinant of audit task performance and that estimating risk in E-Commerce is a particularly daunting task (Hinson, Martin, Brennan, and Evans, 2001). Assuring trust in E-Commerce involves transaction integrity, business practices, and information protection in the B2B context where the transactions, processes, and information span multiple organizational boundaries. Implicit in this finding is the notion that knowledge is an integral component for sustaining competitive advantage as audit firms deliver professional services. "Many audit firms have recognized the strategic importance of knowledge in recent years and have emphasized the management of knowledge as a means to improve profitability," (Thibodeau , 2003, p. 48), and it has been shown that the task being audited should match the expertise of the auditor (Graham, 1993). Further, it has been shown that auditors are overconfident in their ability to assess ERP systems (Hunton, Wright, and Wright, 2005) and this overconfidence may translate to B2B E-Commerce.

B2B has become a strategic necessity in many service sector areas where firms establish collaborative relationships that interlink their transaction / financial systems and processes (Carayannis, Alexander, and Geraghty, 2001; Biggs & Mock, 1983). As Kogan, Sudit, and Vasarhelyi (1999) noted, E-Commerce needs online auditing to provide assurance of the authenticity, integrity, and non-repudiation of the commercial transactions between the B2B partners. So the knowledge needed for these audits is both for the firm and within the industry space of its B2B linkages (Reimers, Li, and Chen, 2004). In this B2B space auditors audit web trust assurance in terms of transaction integrity, business practices, information protection, and legal restrictions (Srivastava and

Mock, 2000). While it has been shown that auditors are overconfident in their ability to assess Enterprise Resource Planning (ERP) risks (Ballou, Earley, and Rich, 2004; Hunton, Wright, and Wright, 2002), the same may be true for B2B audits. Wright and Wright (2002) showed that in ERP an issue for users is segregation of duties with users having access to more than one module; similarly this could be an issue in B2B. This research will examine auditors' knowledge of the B2B enterprise in terms of the proposition that B2B enterprise knowledge of the auditor is an important factor in audit success.

Audit expertise lessens audit risk where risk is "the risk that the auditor may unknowingly fail to appropriately modify his opinion on financial statements that are materially mis-stated." (Libby, Artman, and Willingham, 1985, p. 213; Bonner, 1990). B2B E-Commerce represents an interorganizational isomorphism that can lead to homogeneity in their audit services (Han, 2000) so that a firm's position with respect to its trading partners can lead to similarity in these firms' choice of auditors. Thus the characteristics of a successful audit in one trading partner will be transferable to its other trading partners. While there is little theory with respect to audit practice (Kirkham, and Gaa, 1939), the audit processes increasingly are becoming more challenging particularly in the B2B context (Hunton, 2002).

While pre-E-Commerce research by Trotman (1985) showed that the accuracy of auditors' judgments increased after the review process, further research is needed on auditors' judgments in the E-commerce context where computer based transactions are conducted quickly with little human intervention. Ironically, continuous auditing allows

real time identification of issues and reduction of risk without a formal scheduled audit visit (McCollum, 2004). Another ironical twist with regard to the availability of continuous audit information is the potential for information overload that may encourage the use of heuristic decision processes that could result in misstatements by the auditors (Hunton, Wright, and Wright, 2004). Convergence of these B2B firms in terms of the interconnectivity of their business transactions on a real time basis creates an audit area that has not been well researched. As an example, Jensen (2006) showed empirically in the Enron debacle that status anxiety with regard to audit firms will result in the defection of their audit clients. The difficulties of E-Commerce audits and the ramifications when the expertise of the auditors does not match the complexity of the business processes can lead to unreliable audit results (Graham, 1993). With the broad range of skills needed by effective auditors (Raghunathan and Raghunathan, 1994; Tubbs, 1992), it is proposed that greater audit expertise in B2B audits will lead to more reliable audit results.

**ITAE → ECAJE Information Technology Audit Expertise (ITAE) has a positive, significant contribution on E-commerce Audit Judgment Expertise required in reliable E-Commerce audits.**

## III. Model Operationalization

Using the above hypothesized relationships, the research model in Figure 2 contains the constructs: Information and Communication Technology Expertise (ICTE), Information Technology Audit Expertise (ITAE), and Systems Change Management Expertise (SCME) as independent variables, and E-Commerce Audit Judgment Expertise

(ECAJE) as a dependent variable. The following discussion operationalizes these constructs.

**--- Insert Figure 2 Research Model about here**

## Information and Communication Technology Expertise (ICTE)

ICTE indicates the depth and breadth of knowledge, training, and experience for the auditor in E-Commerce information and communication technologies in response to Weber (2001) call for auditor technology expertise in the B2B context. Internet, extranet, and intranets are designed and devised on various communication network platforms with different layers of security (Ghosh 2002, McGraw 2002). The E-Commerce auditing processes require a relatively higher level of understanding of information technologies for an auditor to be successful (CICA 2002, 1996, 1993, McConnell 2002, Welch, Ragsdale, and Schepens, 2002). An important focus for the auditor is advanced computer systems training in B2B audit techniques (DeYoung 1989). Wide ranging experience, training and skills in information technologies has a positive influence on the B2B E-Commerce auditors' expertise in information and communication technology (ICT) (Hsiung, Scheurich, and Ferrante, 2001; Ashton, 1991; Srivastava & Mock, 2000). Familiarity with the best practices followed in different environments regarding computing and networking helps auditors to render effective judgments (Bagranoff and Vendrzyk, 2000; Lamberton, Fedorovicz, and Roohani 2005, Half, 2001, Hunton, Wright, and Wright, 2005).

From this literature the following four Likert scaled survey items were developed to ascertain the auditors Information and Communication Technology Expertise:

ICTE1. Indicate your degree of expertise in advanced computer systems concepts, methods, technologies and tools.

ICTE2. Indicate your degree of expertise in application systems development

ICTE3. Indicate your degree of expertise in various operating systems concepts

ICTE4. Indicate your depth of experience, training and skills in operating systems programming tasks

## Systems Change Management Expertise (SCME)

Systems Change Management Expertise (SCME) indicates the depth and breadth of knowledge and training in systems and network change management and in security vulnerabilities of client and partner organizations (Half, 2001; Bagranoff & Vendrzyk, 2000; Ba & Pavlou, 2002). The B2B E-Commerce environment is highly technology centric and changes are often necessary to increase the overall productivity of the processes (Hunton, Wright & Wright; 2005) with change management one of the most important controls an auditor can assess in a complex accounting information systems environment. Effective change management is also concerned with regulatory governance as described in the global technology audit guideline document of the Institute of Internal Auditors of USA (Taylor et al, 2005).

Improperly managed change results in unreliable networks, systems, and data which can coexist with improper authorization, weak separation of duties, excessive resources devoted to firefighting (unplanned work), inordinate restarts and re-runs, and difficulty in diagnosing the causes of the inevitable problems that result. Uncontrolled or a weakly controlled change environment is an invitation to unexpected risks to processes,

transaction integrity and the overall reliability and trustworthiness of business systems (Lee et al, 2003).

In a well managed environment, system and network monitors recognize unauthorized or inappropriate changes immediately because they violate the environment's "signature" or normal processing balances and thresholds (Patton & Audun, 2004, Reimers, Li, and Chen, 2004). ). From this discussion the following two Likert scaled survey items were developed to ascertain the auditors' Systems Change Management Expertise.

SCME1. Indicate your degree of expertise in B2B E-Commerce systems and in network change management.

SCME2. Indicate your degree of expertise in intrusion detection, prevention and management procedures.

## Information Technology Audit Expertise (ITAE)

Historically, external auditing has related to financial matters. It is now applied to other disciplines such as quality, environment, safety, information systems and security, and it is expected that the breadth of B2B E-Commerce auditor's expertise in business, auditing and accounting, computer science, networking, etc. has a material influence upon audit quality (Lamberton, Fedorovicz, and Roohani, 2005, Half, 2001, Hunton, Wright, and Wright, 2005), and on the ultimate success of the B2B audit engagement (Bornstein, 1996; Bruno 1994) in the more complex E-Commerce scenarios (CICA, 2002). Thus the auditor's expertise in the technical details of computers, networks, security, and auditing (Ashton, 1991; Brazel, 2005; Bagranoff & Vendrzyk, 2000;

Nelson, Bonner, and Libby, 1997) are all important components of productive good audits in an E-Commerce context.

From this literature the following two Likert scaled items were developed to assess Information Technology Audit Experience (ITAE):

ITAE1. Indicate the degree of expertise you have in the use of information systems auditing tools, techniques and methodologies.

ITAE2. Indicate the degree of expertise you have in auditing and review of E-Commerce websites.

## E-Commerce Audit Judgment Expertise: A Latent Dependent Variable

E-Commerce Audit Judgment Expertise indicates the expertise of E-Commerce auditors in professional audit judgment and their experience and training in planning audits, audit management, and making decisions regarding the audit (Merchant, 1990; Schimidt, Hunter, and Outerbridge, 1986; Bonner and Lewis, 1990). The professional judgment of auditors is an important dimension of any auditing situation (Libby and Tan, 1994). In E-Commerce auditing, the technical areas within which professional judgment is exercised: (1) expertise in computing technology related judgments including database management, networking, data communications (Frantz 1999) and auditing judgment including security issues. It is reasonable to expect that the E-Commerce technical expertise of the audit staff in these areas will affect the potential for a successful audit. Another expertise area needed for the effective audit of E-Commerce is (3) expertise in evaluating the relevance and materiality of planned audit activities (CICA 2002).

From this literature the following three Likert scaled items were developed to assess E-Commerce Audit Judgment Expertise (ECAJE):

ECAJE1. Indicate the extent of your knowledge and training in evaluation of the relevance and materiality of planning in E-Commerce auditing.

ECAJE2. Indicate the extent of your skill and training at establishing a proper mix to ensure that the expertise required for conducting an E-Commerce audit is included in the audit team.

ECAJE3. Indicate your training and experience in understanding the importance of the long term context of the technical audit decisions taken in the short term.

# IV. Methodology and CFA Results

## Construct Refinement

For the research model in Figure 2, to assess the proposed factors leading to sound E-Commerce audit judgment, the construct items were pre-tested using Q-sorting [4] (Moore and Benbasat; 1991). Through this process of item refinement with the panel consisted of senior accounting majors who had coop and/or full time audit experience in Big-4 audit firms [5] the resulting survey items were refined.

## The Survey

To insure the use of expert respondents (Huber and Power 1985; Hufnagel and Conca 1994), the accreditation bodies [6] of auditing professional that limit membership to professional credential holders who are active auditors were contacted: American Institute of Certified Public Accountant (AICPA), Canadian Institute of Chartered

Accountants (CICA), Institute of Chartered Accountants of England & Wales (ICAEW), Institute of Chartered Accountants of Australia (ICAA), and the Information Systems Audit and Control Association (ISACA). The respondents who were professionally qualified with B2B E-Commerce audit experience were solicited via e-mail and newsletters containing the survey website link. Similarly, the first author sent e-mails to members of the "Big-4 Accounting Firms"; and the accounting faculty in Europe, North America, Asia, and Australia were contacted to encourage professional auditors in their respective countries to complete the online survey[7].

The audit expertise survey website hosted by the first author's university consisted of a cover page with a formal request followed by second page briefly describing a B2B e-commerce audit followed by demographic items and the 38 items to assess B2B E-Commerce audit expertise[8]. The survey items were five point Likert scaled from strongly disagree to strongly agree with the web link available from October 1, 2005 until December 31, 2005. Over 80% of the responses were returned in the first three months after the messages from AICPA, ICAA and ISACA reached their membership. Only less than 20% responses came later during the December month with no significant non response-bias noted. Table 1 reflects the educational level of the respondents. Table 2 contains demographics on the respondents. The average age of the respondents was approximately 40 years with B2B E-Commerce audit experience approximately more than six man-years (ranging from 0-.20 man years). The number of E-Commerce audits conducted by these respondents was divided into pre-2000 and post-2000 periods as B2B E-Commerce acquired prominence in the post-2000 period. The

average number of such audits performed by the respondents' was 28 (These numbers may sound too big but after confirming from several audit partners/directors, we noted that often these assignments are not complete financial attestation engagements and mixed with many restricted scope internal consulting audit engagements performed on clients' requests.). as shown in Table 2.

----------**Insert Table: 2 and Table: 3**

Table 3 shows the countries in which the respondents were certified to practice auditing. Approximately little more than half of the respondents came from United States and Canada and the rest from various other nations. Almost all the respondents were found to be trained in information technology (IT) audit; and most of them were holding certification awarded by the ISACA or similar agencies in their countries.

Overall the response rate could not be determined for the respondents as the newsletter notifications were generally sent to many members who might not fall in the potential respondents' category. Secondly, most of the respondents were certified information systems auditors as well as financial auditors; hence many respondents received messages from two organizations. The first author received 212 distinct assessments of the survey items during the survey period. Nine responses could not be used and had to be discarded, leaving 203 useable assessments of the scales. Missing value imputations were done by indirect method using the linear regression method[9]. This method uses missing data as dependent variable and completed data as predictors. This approach provides for greater variability with some loss/restriction on variance in comparison to other methods (Byrne, 2001; Yuan and Bentler, 1995; Rovine, 1994).

To assess the validity of considering the respondents as one set of respondents versus comparing auditors steeped in Western based audit systems versus those from other parts of the world, pair-wise T-tests were conducted and are shown in Table 4.

**----------Insert Table: 4 (Matched Pair T-tests)**

Comparisons revealed only one item with a significance mean difference: "Extent of your skill and training at establishing a proper mix to ensure that the expertise required for conducting an E-Commerce audit is included in the audit team". The mean was higher for the non-Western countries. This may be attributable to the challenges faced by a non-Western auditor in putting together a team where fewer experts are available. Based on this analysis including these respondents into one dataset does not introduce consistent bias into the analysis of this data.

## Structural Equations Assumptions

Two assumptions of structural equation modeling using maximum likelihood are multivariate normality and model identification or determinacy (Segars and Grover 1998). Examination of plots of the items showed that the items were distributed normally and the bivariate scatter plots were linear and homoscedastic. Also examination of the intercorrelations did not reveal multicollinearity (Table 5).

**----------Insert Table: 5 (Inter-Item Correlation Table)**

## Measurement Properties

As discussed previously the theoretical constructs were operationalized in terms of the constructs shown in Figure 2 and the items shown in Table 4. Structural equation modeling (SEM) was used to assess if these items loaded on the theorized construct

(Bollen 1989; Joreskog 1993) and was used to examine the consistency of the theorized structural model (Figure 2). As recommended by Joreskog (1993) and Anderson (1987), each latent variable was modeled first in isolation, then in pairs and lastly, as a collective network. This method of evaluation has an advantage of achieving fullest evidence of efficacy of the measurement model and reduces potential confounding to a greater extent in the composite structural equation modeling. **A**nalysis of **M**oments **O**f **S**ample (AMOS v6 r1.1) a tool of SPSS (v14 r14.0.0) was used as an analytical means for testing statistical assumptions and estimation of the measurement and structural equation models described in the following sections of the paper. **P**artial **L**east **S**quare-Graph, version 03, built 1126 individual t-values, and composite factor reliability ( $\rho_c$ ) for the individual constructs.

First order confirmatory factor analysis was used to establish the validity and consistency of the eleven manifest variables in terms of the four theorized latent constructs. The maximum likelihood estimations of loadings (using oblique rotation criterion to extract factors with eigenvalues >=1) and variance extracted are shown in Table: 6 and Figure: 3. Further, comparing the reliability and quality measures for the constructs and items with the recommended minimum values, we find that the recommended minimum values are met or even clearly exceeded. We therefore conclude that our factors reliably reflect the constructs within the structural model.

**----------Insert Figure: 3 and Table: 6**

Table 6 shows the ML estimations of the loadings and the variance extracted from each indicator variable. The measures for global model fit included in Figure 3 suggest

that our covariance structure model fits the underlying data quite well. The values for the goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), and Normed fit index (NFI), Comparative Fit Index (CFI) clearly exceed the recommended minimum value of 0.9 (Bagozzi and Yi,1981, Bentler and Bonnett, 1980). The root mean square residual [10] (RMR) value of 0.05 is also good. The global fit indexes and the normed chi square were greater than 0.9 and less than 5 (in our Model, it is 2.20), respectively. Individual constructs were tested to establish discriminant validity of each dimension as shown in Table: 7.

----------**Insert Table: 7**

The Cronbach alpha coefficient for each construct, respectively in Figure: 3 is >0.7 as suggested by Nunnally, (1978). Table 7 depicts various measures to identify the discriminant validity of each construct used in the research (Figure 3) and the results establish the discriminant validity of the constructs used in the model. Table 7 also presents the inter-construct correlations and the composite reliability measures for each construct in the model.

The fit measures are found to be extremely good except that the diagnostic indices for two of the indicators (these indicators are shown in bold in Table 6) were above 5 which meant that the measurement errors were correlated in some way. We conducted an alternate model testing by deleting these two indicator variables (ECAJE2 and ICTE1) from the study. The model, thus, refined is shown with its ML standardized estimates of inter-construct correlations in Figure: 4.

----------**Insert Figure: 4**

The model in Figure 4 has a normalized chi-square value of 2.76 with 21 degrees of freedom. The global fit indexes are superior to the earlier model with eleven indicators. The goodness of fit (GFI) index is 0.943 and the comparative fit index is 0.96. The RMR is 0.045 which is also smaller than the original model in Figure: 3. Comparison of the two alternative models is shown in the Table 8 and as Arbuckle (2005) suggests that model comparison is easily done by comparing the RMR values [10] of the models. We, therefore, discussed the refined nine items only in our research model parameter estimations in the following section.

**----------Insert Table: 8**

## V. Findings

Our research, using both quantitative and confirmatory approaches, provides empirical results from a reasonably large survey (N=203) of E-Commerce auditors representative of the E-Commerce audit practices of both Western and non Western nations. This study on B2B E-Commerce presented the theoretical factors that lead to E-Commerce audit judgment expertise: systems change management expertise, information and communication technology expertise, and IT audit expertise. The research model was supported for five hypotheses of the six hypothesized relationships. Figure 5 depicts the path coefficients for this model and also shown in tabular form in Table 9.

**----------Insert Figure: 5 and Table: 9**

First order confirmatory factor analysis provided support for the loadings of the manifest items on the theorized latent constructs. These items were developed from the theory and verified with a Q-sorting technique to assess the content and face validity of

the items. Confirmatory factor analysis provided more content validity support with the items loading on the theorized constructs.

In the first hypothesis (H1) it was proposed that in the context of successful E-Commerce audits that Information and Communication Technology Expertise (ICTE) would have a positive and significant impact on System Change Management Expertise (SCME). The analyses provided strong numerical support for this hypothesis with a regression path coefficients of 0.43 at p=0.01. This relationship shows that a stronger knowledge/skill level in information and communication technology has positive effect on system change management expertise which is a specialized area of expertise dependent on the IT expertise.

The second hypothesis (H2) dealt with the relationship of ICTE with ITAE. It was proposed that Information and Communication Technology Expertise would have a positive and significant contribution on Information Technology Audit Expertise (ITAE) in successful E-Commerce audits. The results for H2 weakly supported the hypothesis with a path coefficients value of 0.18 and p=0.1. The main cause for these low values may lie in the fact that often e-commerce auditors who are expert in IT audit have merely adequate ICTE knowledge in IT audit practice.

Our third hypothesis (H3) states that Information and Communication Technology Expertise has a positive, significant contribution on E-commerce Audit Judgment Expertise in successful E-Commerce audits. This relationship was expected to be highly significant in view of the knowledge that E-Commerce is highly technology-centric in its methods, processes and controls and ICTE effectively adds value to the

overall effectiveness of E-Commerce audit judgment. The empirical results were highly favorable and significant where the path coefficients of 0.32 significant at p=0.01.

Our hypothesis regarding relationship of ITAE with ECAJE (H4) is the one which is proposed to be positive and significant. The H4 states that Information Technology Audit Expertise (ITAE) has a positive, significant contribution on E-Commerce Audit Judgment Expertise in successful E-Commerce audits. The path coefficient of 0.71 at p=0.01 provided strong support for our proposition and corroborates the demographic statistics obtained in this study where more than 90% of the respondents have reported to have been trained in IT audit area. We also observed that an even greater majority of the respondents (91.2%) had obtained certifications in IT audit from ISACA or other certification bodies.

The fifth hypothesis (H5) pertained to the relationship between SCME and ITAE. We surmised that System Change Management Expertise (SCME) has a positive, significant impact on Information Technology Audit Expertise (ITAE) in successful e-commerce audits. The results provided strong support for this proposition with a path coefficient value of 0.56 at p=0.01. This result is useful for future studies as system and network change management expertise is an important component in securing networks and organizational systems. These findings suggest that E-Commerce in general and B2B E-Commerce in particular depend on technology support and an E-Commerce auditor needs to obtain significant understanding of systems and network change management practices and processes in order to become successful e-commerce auditor.

Empirical support was not obtained for the sixth hypothesis where it was hypothesized that System Change Management Expertise (SCME) has a positive, significant impact on E-commerce Audit Judgment Expertise (ECAJE) in the context of successful E-Commerce audits. However, the path coefficients value of -0.22 at p=0.1 suggests that no such positive relationship exists and actually has a negative direct impact on ECAJE; however the path model shows that SCME does impact ECAJE indirectly with its impact on ITAE. This implies that SCME is important for ITAE to have successful E-Commerce audits. And, IT audit expertise is dependent on change management expertise and on information and communication technology expertise. Change management without the necessary technology skills will not produce a successful E-Commerce audit.

The entire path model with ECAJE as the dependent variable explained 59% variance in our model where SCME, ITAE and ICTE are predictors, suggesting a satisfactory outcome of our model in total. Individually SCME and ITAE as independent variables explained 18% and 43% variance respectively. SCME is a composite of various skills and knowledge sets and the ICTE as a predictor to SCME is one such component. The variance explained by SCME is limited to 18% as it was not within our scope of study to identify other skill sets for SCME and ICTE as outcome and predictor variables. However, ITAE construct's explanation of 43% variance is meaningful considering ICTE as a predictor variable, since IT audit has a significant relationship with ICTE in the success of E-Commerce audits in B2B entities.

## VI. Limitations, Implications & Future Directions

The current study attempts to bring a theoretical and operational refinement concerning the nature of audit judgment expertise concept in the B2B E-Commerce context. Such attempts are ambitious in character and hence, contain some innate limitations. The noteworthy limitation of this study is the range of constructs needed to define E-Commerce expertise. No claim can be made that every E-Commerce aspect has been captured in the ECAJ expertise construct. Several rounds of theory building using research and expert opinions have been incorporated in the development of the model. The sample used in this study is another possible limiting factor. To extend the external validity of this study further corroborating studies are needed to corroborate the findings. Therefore, the results are generalizable to the population of auditing organizations participating in the study.

Another limitation noticed during the analysis of empirical observations pertained to the item refinement process where a larger number of professionals could be added to the panel of different cultural professional groups for item refinement. This study would have benefited from a sample that had more respondents from non-Western countries enabling the researchers to address the proposed model while controlling for Western versus non-Western respondents. A true test of this model would be to see if the hypotheses hold while modeling across these two groupings.

The findings of this study appear strong in terms of content and construct validity, and validation. Longitudinal construct measurement would allow for the assessment of the causality of various relationships of the proposed model. In the end, a valid confirmation of theoretical model should be addressed through model re-estimation on an

independent or hold out sample, but given the limited sample size this was not done in this study. However, these findings appear strong in terms of content and construct validity; these findings must be viewed as preliminary and in need of further confirmation.

The most significant contribution made by this study to the accounting literature lies in the empirical validation of the E-Commerce audit judgment expertise model. The growth of E-Commerce technologies and the need for specific expertise in auditing such entities has a created significant desire on the part of the audit community to expand its knowledge base. Results of this study provide direction for expanding auditors' E-Commerce audit expertise.

**Figure 1 Auditor Intellectual Capital**

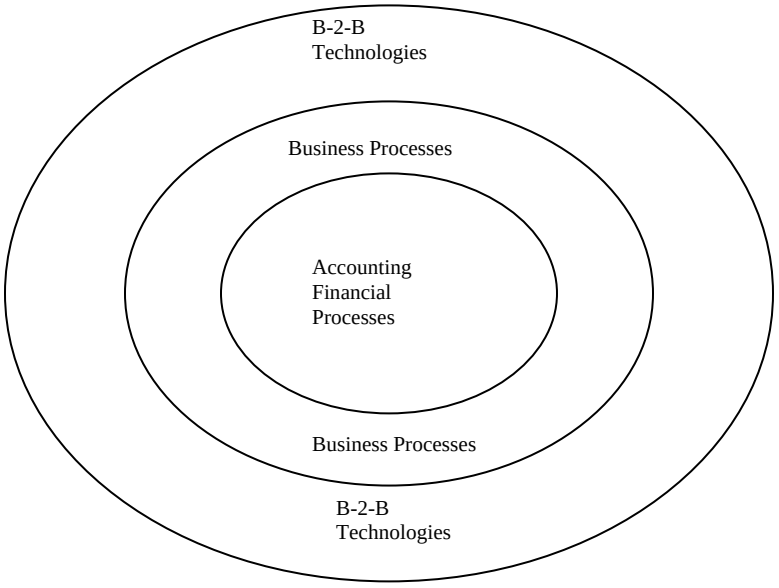


**Figure: 2 Research Model:**

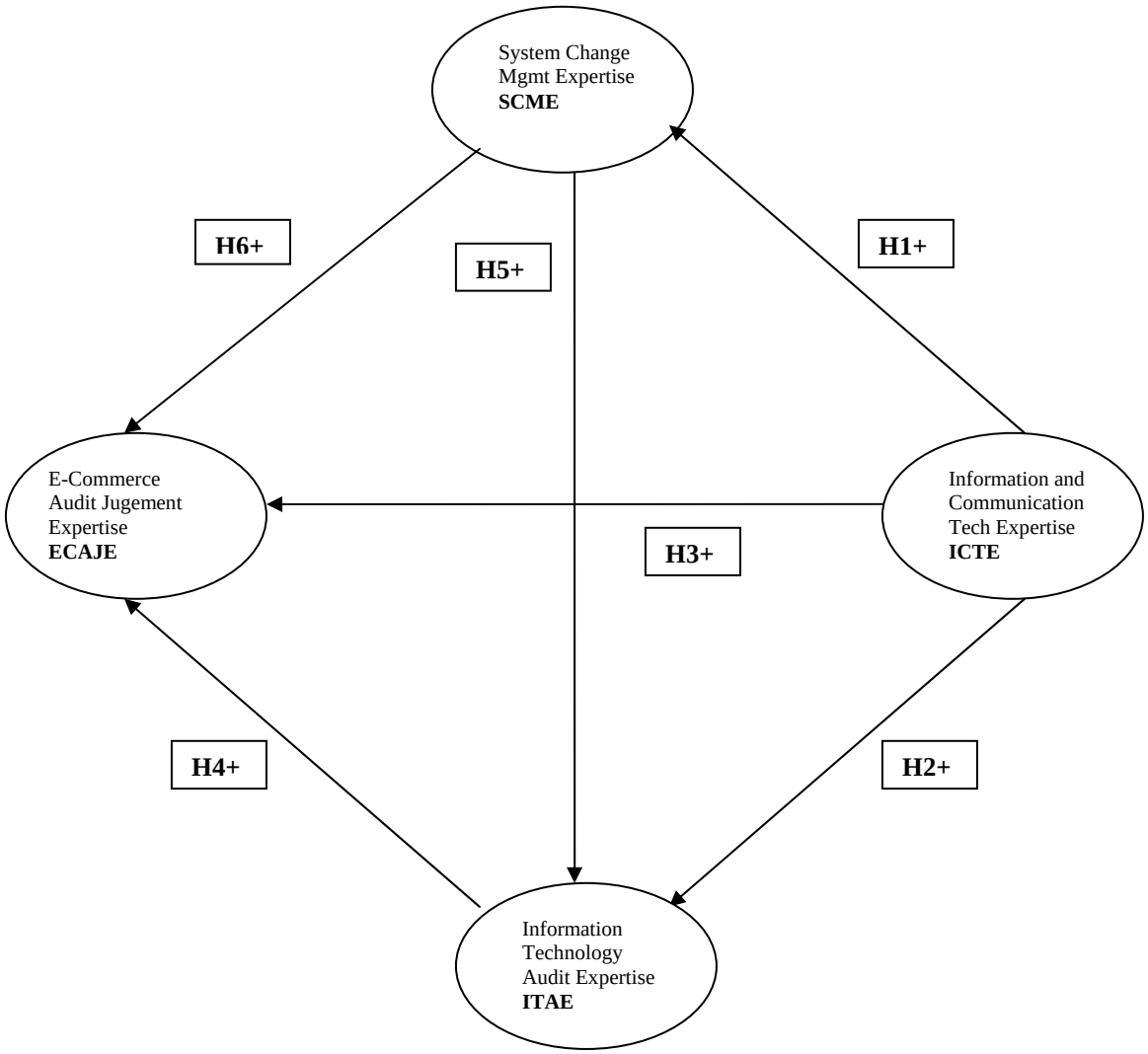


**Figure: 3 Maximum Likelihood Estimation-based Measurement Model (With 11 indicators)**

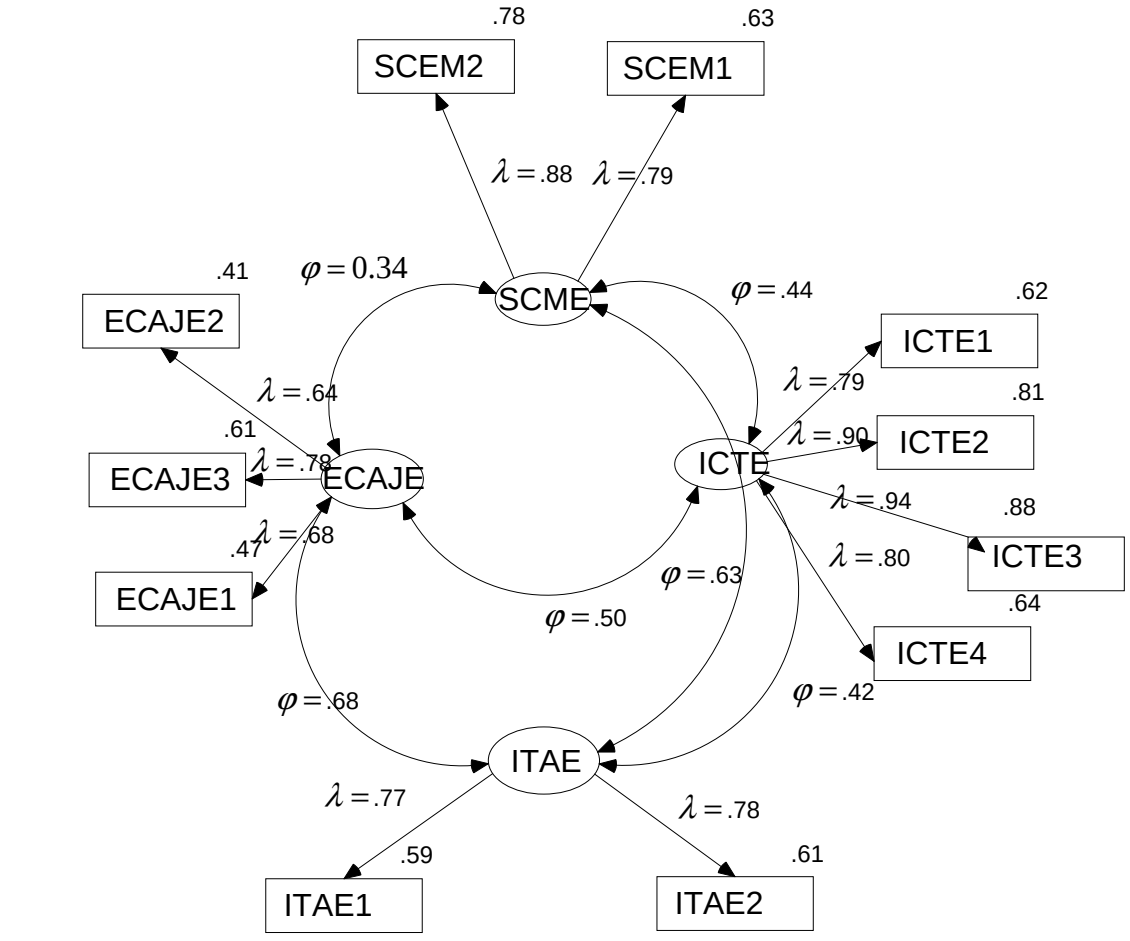
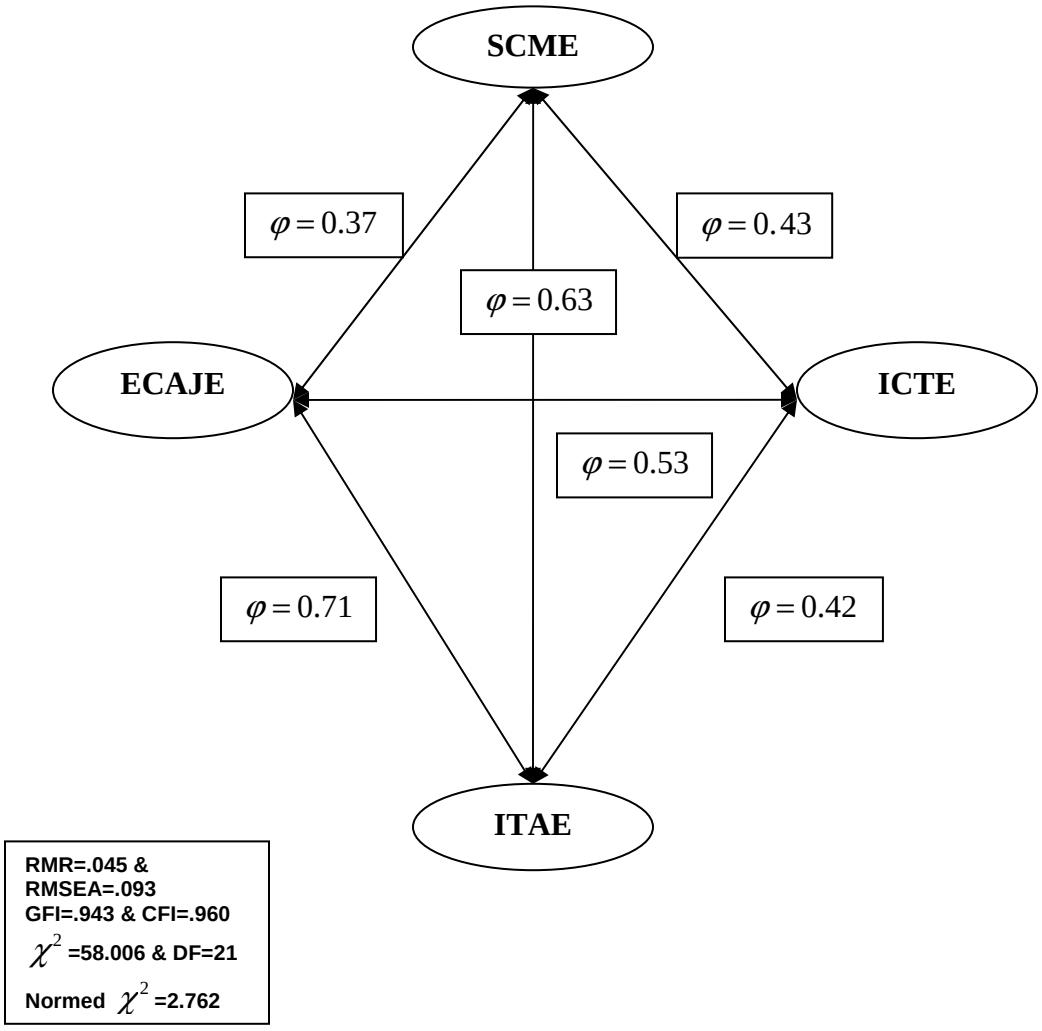


**Figure: 4 Refined Measurement Model** (With final 9 indicator variables)**




**** Note:** Figure depicts the refined measurement model with inter-construct correlations and various fit measures. Manifest variables and related loadings are shown in the Table: 9.

**Figure: 5 Validated Structural Regression Model**

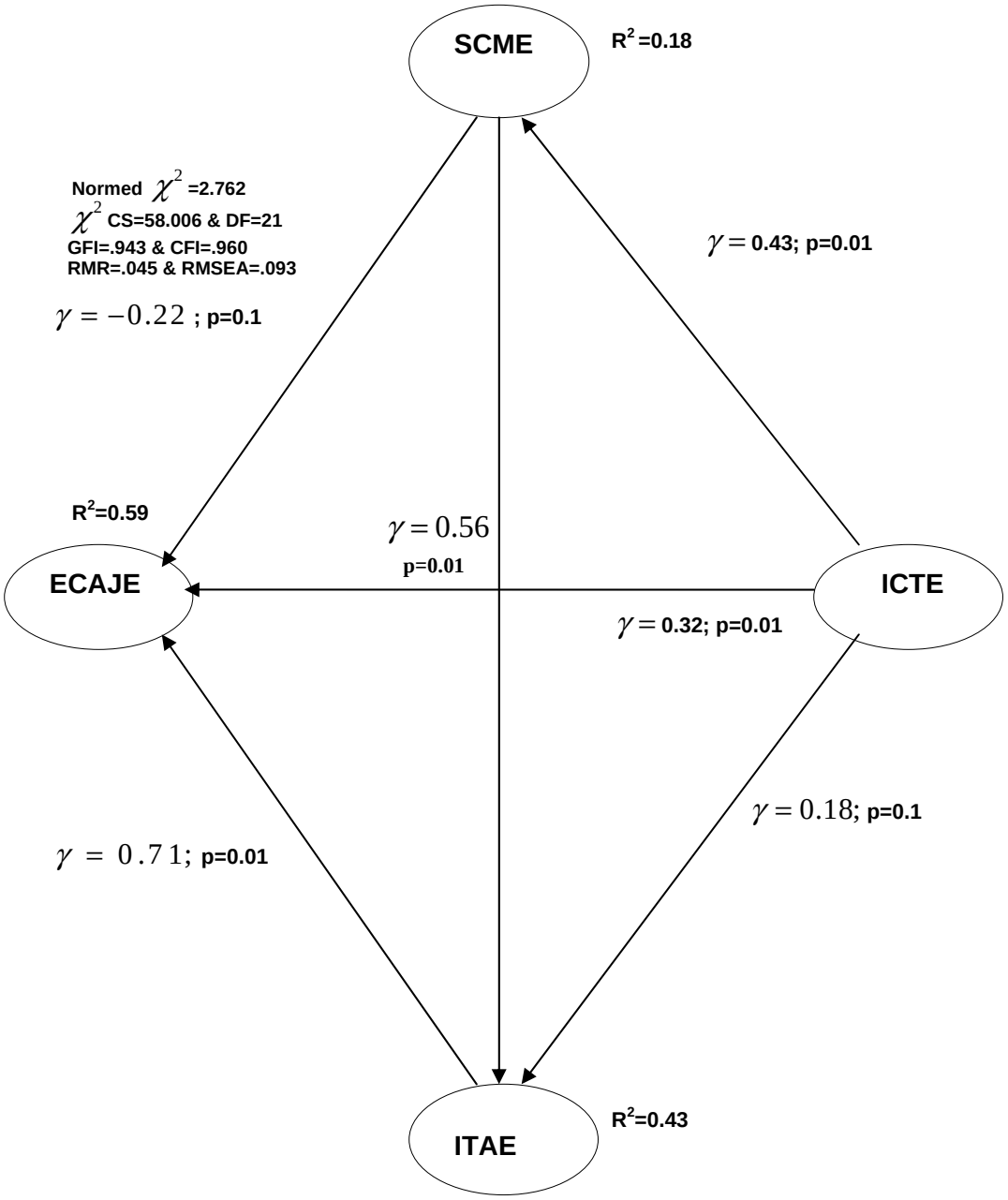


**Table: 1 Respondent's Education**

| Education | N | % |
|---|---|---|
| Not Provided | **3** | **1.48** |
| Bachelor's Degree | **81** | **39.90** |
| Diploma of Community College | **5** | **2.46** |
| Doctoral Degree | **9** | **4.43** |
| Master's Degree | **105** | **51.72** |
| Total | **203** | **100.00** |

**Table: 2 Demographic Statistics**

| | N | Min | Max | Mean | Std. Deviation |
|---|---|---|---|---|---|
| **Age** | **201** | **23** | **61** | **39.67** | **8.01** |
| **Audit Years** | **203** | **0*** | **20** | **6.21** | **4.52** |
| **Numbers of Audits Performed Before year 2000** | **203** | **0** | **150!** | **6.61** | **15.22** |
| **Numbers of Audits Performed After 2000** | **203** | **0** | **246&** | **28.11** | **43.26** |

*There were 6 such respondents newly credentialed with no or less than a year's experience in e-commerce audit.

!Mostly pre-2000 audits performed were assumed to be mix of e-commerce with conventional systems audits.

&Post 2000 audits performed were assumed to be highly technology-centric because most businesses opted for e-commerce at B2B level in this period with the increased and robust security techniques employed in B2B scenario.

**Table 3 Respondents' Audit Practice Countries**[1]

| | | |
|---|---|---|
| South Korea | 2 | 0.99 |
| Spain | 1 | 0.49 |
| Sri Lanka | 1 | 0.49 |
| Switzerland | 1 | 0.49 |
| Taiwan | 1 | 0.49 |
| Thailand | 3 | 1.48 |
| Turkey | 2 | 0.99 |
| U.S.A. | 1 | 0.49 |
| UK | 10 | 4.93 |
| Ukrain | 9 | 4.43 |
| Zambia | 1 | 0.49 |
| China | 1 | 0.49 |
| Colombia | 4 | 1.97 |
| Cyprus | 2 | 0.99 |
| Egypt | 1 | 0.49 |
| EU | 1 | 0.49 |
| Europe | 2 | 0.99 |
| Finland | 1 | 0.49 |
| France | 2 | 0.98 |
| Germany | 1 | 0.49 |
| Globally | 3 | 1.48 |
| Greece | 2 | 0.99 |
| Guyana | 1 | 0.49 |
| Hong Kong | 1 | 0.49 |
| India | 3 | 1.48 |
| Japan | 20 | 9.85 |
| Kenya | 4 | 1.97 |
| Malawi | 2 | 0.99 |
| Malaysia | 1 | 0.49 |
| Malaysia, India | 2 | 0.99 |
| Malta | 1 | 0.49 |
| Mauritius | 1 | 0.49 |
| Mexico | 1 | 0.49 |
| Middle East | 4 | 1.97 |
| Netherlands | 1 | 0.49 |
| New Zealand | 2 | 0.99 |
| Nigeria | 1 | 0.49 |
| Pakistan | 2 | 0.99 |
| Peru | 3 | 1.48 |
| Poland | 1 | 0.49 |
| Portugal | 1 | 0.49 |
| Russia | 1 | 0.49 |
| Saudi Arabia | 1 | 0.49 |
| Singapore | 1 | 0.49 |
| South Africa | 3 | 1.48 |

[1] Some respondents did audit work in more than one country

**Table: 4 Matched Pair T-Test Results**

| | Mean | Mean | Paired Mean | t | Sig. (2-tailed) |
|---|---|---|---|---|---|
| | North | Rest of | Differences | Value | |
| **Survey Items** | **America** | **World** | | | |
| Degree of expertise in advanced computer systems concepts, methods, technologies and tools **ICTE1** | **3.12** | **2.99** | **0.13** | **0.68** | **0.500** |
| Degree of expertise in application systems development **ICTE2** | **3.45** | **3.22** | **0.23** | **1.30** | **0.195** |
| Degree of expertise in various operating systems concepts **ICTE3** | **3.29** | **3.04** | **0.25** | **1.38** | **0.170** |
| Depth of experience, training and skills in operating systems programming tasks **ICTE4** | **3.24** | **3.10** | **0.14** | **0.90** | **0.369** |
| Degree of expertise you have in the use of information systems auditing tools, techniques and methodologies. **ITAE1** | **4.58** | **4.60** | **-0.02** | **-0.20** | **0.842** |
| Degree of expertise you have in auditing and review of E-Commerce websites. **ITAE2** | **4.16** | **4.25** | **-0.09** | **-0.75** | **0.468** |
| Degree of expertise in B2B e-commerce and in network change management. **SCME1** | **4.27** | **4.09** | **0.17** | **1.54** | **0.127** |
| Degree of expertise in intrusion detection, prevention and management procedures. **SCME2** | **4.21** | **4.20** | **0.01** | **0.06** | **0.956** |
| Extent of your knowledge and training in evaluation of the relevance and materiality planning in E-Commerce auditing. **ECAJE1** | **4.12** | **4.23** | **-0.12** | **-1.17** | **0.246** |
| Extent of your skill and training at establishing a proper mix to ensure that the expertise required for conducting an E-Commerce audit is included in the audit team. **ECAJE2** | **3.74** | **4.18** | **-0.44** | **-3.43** | **0.0009*** |
| Extent of training and experience in understanding the importance of the long term context of the technical audit decisions taken in the short term. **ECAJE3** | **4.34** | **4.24** | **0.09** | **0.78** | **0.435** |

*** p < .001**

**Table 5 Inter-item Correlations**

| Items | ECAJE2 | ICTE1 | ITAE2 | ITAE1 | ICTE2 | ICTE3 | ICTE4 | ECAJE1 | ECAJE3 | SCME2 | SCME1 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **ECAJE2** | 1.000 | | | | | | | | | | |
| **ICTE1** | .255 | 1.000 | | | | | | | | | |
| **ITAE2** | .275 | .150 | 1.000 | | | | | | | | |
| **ITAE1** | .387 | .211 | .553 | 1.000 | | | | | | | |
| **ICTE2** | .291 | .713 | .171 | .241 | 1.000 | | | | | | |
| **ICTE3** | .303 | .741 | .178 | .250 | .846 | 1.000 | | | | | |
| **ICTE4** | .258 | .631 | .152 | .213 | .721 | .749 | 1.000 | | | | |
| **ECAJE1** | .463 | .280 | .303 | .425 | .320 | .333 | .284 | 1.000 | | | |
| **ECAJE3** | .489 | .296 | .320 | .449 | .338 | .351 | .300 | .538 | 1.000 | | |
| **SCME2** | .188 | .310 | .288 | .404 | .354 | .367 | .313 | .207 | .219 | 1.000 | |
| **SCME1** | .182 | .299 | .278 | .390 | .341 | .355 | .302 | .200 | .211 | .701 | 1.000 |

**Table 6 MLE Factor Loadings & the Squared Correlations (N=203)**

| **Observed Variables** | **Latent Variables** | **ML $\lambda$ estimates** | **Squared Correlations** |
|---|---|---|---|
| SCME1 | SCME | .823 | 0.63 |
| SCME2 | SCME | .852 | 0.78 |
| ECAJE1 | ECAJE | .714 | 0.61 |
| **ECAJE2** | **ECAJE** | **.649** | **0.47*** |
| ECAJE3 | ECAJE | .754 | 0.41 |
| ITAE1 | ITAE | .881 | 0.56 |
| ITAE2 | ITAE | .627 | 0.53 |
| **ICTE1** | **ICTE** | **.790** | **0.62*** |
| ICTE2 | ICTE | .902 | 0.79 |
| ICTE3 | ICTE | .937 | 0.92 |
| ICTE4 | ICTE | .799 | 0.63 |

**NOTE:** * are computed prior to deletion of these two manifest variables.

**Table: 7 Various Discriminant Validity Measurements**

| Dimension/Construct | Cronbach $\alpha$ * | AVE | Composite Reliability ($\rho_c$) | ECAJE | SCME | ITE | ITAE |
|---|---|---|---|---|---|---|---|
| **ECAJE** | 0.76 | 0.75 | 0.86 | **0.87**** | | | |
| **SCME** | 0.82 | 0.85 | 0.92 | 0.37 | **0.92**** | | |
| **ITE** | 0.92 | 0.84 | 0.94 | 0.53 | 0.43 | **0.92**** | |
| **ITAE** | 0.75 | 0.78 | 0.88 | 0.71 | 0.63 | 0.42 | **0.88**** |

* Per Nunnally (1978), alpha should be greater than 0.7.

** The shaded numbers in bold are the square roots of the variance shared between the constructs and their manifest measures. Off diagonal elements are correlations among the constructs as shown in Figure: 3. For discriminant validity, diagonal elements in bold should be larger than off-diagonal elements (see, Agarwal & Karahanna, 2000; Compeau et al, 1999). Diagonal elements =square root $(\sum \lambda_i^2)/(\sum \lambda_i^2 + \sum \theta_{ij})$; Composite Reliability = $((\sum \lambda_i)^2/\{(\sum \lambda_i)^2 + \sum \theta_{ij}\}$ In both the cases, $\lambda$ are the factor loadings and $\theta_{ij}$ are unique error variances = 1- $\lambda_i^2$.

NOTE: Construct values are standardized and normalized; hence, means and variances are 0 and 1 for all the constructs.

**Table: 8 Comparison of Original Model with the refined Model of Regression**

| Model | Chi Square/df | Normed Chi Square | GFI[2] | CFI[3] | RMR | RMSEA [4]at p-level |
|---|---|---|---|---|---|---|
| Figure:2 Original Model | 83.58/38 | 2.20 | 0.93 | 0.96 | 0.05 | 0.077 p=0.025 |
| Figure: 4 Refined Model | 58/21 | 2.76 | 0.94 | 0.96 | 0.045[5] | 0.093 p=0.007 |

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**2 For the purpose of computing GFI in the case of maximum likelihood estimation,** $f(\sum^{(g)}; S^{(g)}$ **is calculated as** $f(\sum^{(g)}; S^{(g)} = \frac{1}{2} tr\left[ K^{(g)^{-1}} (S^{(g)} - \sum^{(g)}) \right]^2$ **with K(g) =** $K^{(g)} = \sum^{(g)} (\hat{Y}_{ML}), where \hat{Y}_{ML}$ **, is the maximum likelihood estimate of** $Y$ **.GFI is less than or equal to 1. A value of 1 indicates a perfect fit.**

**3 The comparative fit index (CFI) ( Bentler, 1990) is given by.** $CFI = 1 - \frac{\max(\hat{C} - d, 0)}{\max(\hat{C}_b - d_b, 0)} = 1 - \frac{NCP}{NCP_b}$ **where** $\hat{C}, d$ **, and NCP are the discrepancy, the degrees of freedom and the non-centrality parameter estimate for the model being evaluated, and** $\hat{C}_b, d_b$ **and** $NCP_b$ **are the discrepancy, the degrees of freedom and the no centrality parameter estimate for the baseline model. The CFI is identical to the McDonald and Marsh (1990) relative non-centrality index ( RNI), except that the CFI is truncated to fall in the range from 0 to 1. CFI values close to 1 indicate a very good fit.**

**4 A value of the RMSEA of about .05 or less would indicate a close fit of the model in relation to the degrees of freedom. This figure is based on subjective judgment. It cannot be regarded as infallible or correct, but it is more reasonable than the requirement of exact fit with the RMSEA = 0.0. We are also of the opinion that a value of about 0.08 or less for the RMSEA would indicate a reasonable error of approximation and would not want to employ a model with a RMSEA greater than 0.1.**

**5 The RMR (root mean square residual) is the square root of the average squared amount by which the sample variances and co-variances differ from their estimates obtained under the assumption that your model is correct: Following function to compute RMR for each model.**

$RMR = \sqrt{\sum_{g=1}^{G} \{ \sum_{i=1}^{p_k} \sum_{j=1}^{j \le i} (\hat{s}_{ij}^{(g)} - \sigma_{ij}^{(g)}) \} / \sum \sum_{g=1}^{G} p^{*(g)}}$ **The smaller the RMR is, the better. An RMR of zero indicates a perfect fit.**

**Table: 9 Structural Regression Model Results**[6]

| **Independent/Dependent Variables** | **Variance Explained/ Squared Multiple Correlations ($R^2$)** | **Path Coefficients ($\gamma$)** | **P-Level** | **Hypothesis Testing Result** |
|---|---|---|---|---|
| ECAJE | 0.59 | - | - | - |
| SCME → *ECAJE* | SCME=0.18 | -0.22 | 0.1 | Not Supported |
| *SCME → ITAE* | | 0.56 | 0.01 | Supported |
| *ICTE → ECAJE*<br>*ICTE → ITAE*<br>*ICTE → SCME* | | 0.32<br>0.18<br>0.43 | 0.01<br>0.01<br>0.01 | Supported<br>Supported<br>Supported |
| *ITAE → ECAJE* | ITAE=0.43 | 0.71 | 0.01 | Supported |
| | | | | |

[6] Chi square value of 58 at df=21; Normed Chi Square= 2.76; Goodness of Fit= 0.94; CFI= 0.96; RMR= 0.045; RMSEA= 0.093

## Endnotes

1. E-commerce entities are defined in this paper as those business organizations whose revenues arise significantly from the e-commerce operations and whose majority of internal controls are integrated into the e-commerce technology-based accounting systems

2. For detailed explanation of the term 'effectiveness', 'more efficient', and 'success' in the context of auditing please see , Brazel (2005); Libby & Luft (1993); Bonner (1990); Bonner & Lewis (1990) & organizational information systems context Subramaniam & Yondt (2005); Reimers, Li & Chen (2004); Segars & Grover (1998); Raghunathan & Raghunathan (1994); Shanteau (1992).

3. COBIT is a framework designed by the Information Systems Audit and Control Association (ISACA) and the IT Governance Institute, USA. Readers are requested to look for further details on Control Objectives for Information and Related Technology (COBIT) on the ISACA website at www.isaca.org/ .

4. Q-sorting technique helps researchers in identifying a priori the potential understanding of instrument items. Here either an expert panel or a group of potential respondents were provided the information about the constructs and the items that the construct were to identify. This exercise substantially improves the content validity a priori of these instrument items where new items had to be developed. Given the limited empirical work done in the area of E-Commerce auditing, the first author used the Q-sorting technique to define the theorized construct.

5. Windsor city in Canada has major manufacturing bases of Ford-Canada, General Motors-Canada & Daimler-Chrysler-Canada. These three manufacturers are heavily into the B2B e-commerce activities. The first author requested ten students to assist in the pre-test of this survey; however, only five students had the time to help in the entire process and they ensured that whatever is suggested by them in discussion is pre-consulted with the professional e-commerce auditors who were/are their supervisors during coop period.

6. Senior management at the five professional bodies were personally contacted since their audit members have been involved in E-Commerce audit in general and B2B audit in particular. Particularly AICPA & CICA are extremely active in this E-Commerce audit work.

7. Deciding on the response rate is tricky here as ISACA, HQ informed the first author that e-mails soliciting support for the survey are sent to 1830 members on its live register who have reported them having experience in e-commerce related audit activities. However, authors can not ascertain how many of them have reported after getting mails from ISACA HQ and how many responded after reading newsletters from other professional accounting bodies from US/Canada/UK/Australia. Even assuming that most of these respondents received information from more than one sources to participate in our study, the overall numbers contacted can not be more than 1850 at most. This makes our response rate close to 11.46%.

8. This paper uses only a part of these responses as the rest will be analyzed for other purposes.

9. No maximum likelihood estimation using structural equation is possible if the sample size gets reduced to less than the required number of complete cases per indicator variable. It was noted that list-wise deletion' procedure reduced our sample to less than minimum, and did not permit us to compute structural and measurement estimations. That's why; we did not perform our tests on only fully completed cases.

10. The RMR (root mean square residual) is the square root of the average squared amount by which the sample variance and covariance differ from their estimates obtained under the assumption that your model is correct. It is, in fact, a badness of fit index and, if computed from standardized variables, a value of RMR should not be more than 0.1 (Kline, 2005, p.141) where the smaller the RMR the better. An RMR of zero indicates a perfect fit.

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