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DEVELOPING A STANDARDISED MODEL FOR INTERNAL CONTROL EVALUATION

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ABSTRACT

This study develops an internal control evaluation (ICE) model – a prototype matrix model – which addresses limitations noted in previous studies. Ninety-four auditors from five firms evaluated the internal control structure of a fictitious entity using their current firm methodology and the ICE model, and compared methods. For "overall usefulness" and three factors, "cost"; "logical development"; and "time to complete", auditors ranked the ICE model as highly as current evaluation methods. For one factor, "completeness", two firms considered it less beneficial. Results indicate attempts to develop a standardised evaluation model are worthwhile. Such a model may benefit the auditing profession, as standardisation may support the stance for self-regulation.

INTRODUCTION

In the past 10 years the accountancy profession has devoted significant energy to the development of satisfactory internal control structures. This has been a worldwide phenomenon, primarily done to assist economic entities achieve their goal of satisfactory corporate governance. Felix (1998, p. 1) attributes the interest in internal controls to two factors:

1. Concern about inconsistent views and understanding of internal controls in public companies
2. Political pressure resulting from some alleged notorious audit failures.

One of the most significant results of all the activity in this area was the issuing in 1992 of a set of documents entitled *Internal Control - Integrated Framework*, by the Committee of Sponsoring Organisations (COSO) of the Treadway Commission, which included a framework for internal control. The model came to be known as the COSO model of internal control. The COSO model, as described by Simmons (1997, p. 69), views internal control as a process that attempts to assist management in achieving its overall objectives in the following three areas:

1. Effectiveness and efficiency of operations
2. Reliability of financial reporting
3. Compliance with applicable laws and regulations.

COSO then identifies five interrelated components of internal control as follows:

1. The control environment
2. Risk assessment
3. Control activities
4. Information and communication
5. Monitoring.

Management are to use this model of internal controls in order to set up and monitor their own organisations properly. In August 1994 the Canadian Criteria of Control Committee (CoCo) issued a similar model to the COSO model developed in the US. Similarly in the United Kingdom, in December 1994, the Working Group on Internal Controls of the Committee on the Financial Aspects of Corporate Governance (Cadbury Committee) issued a document entitled *Internal Control and Financial Reporting*. This model came to be known as the Cadbury model of internal control. Again it is very similar to the COSO and CoCo models in terms of definition and objectives of internal control.

External review of these internal controls, performed by external auditors, constitutes a critical component of the financial statements audit function (Arens, Best, Shailer, Fiedler and Loebbecke, 2002, p. 317), and, as noted by Ashton (1974), it is an activity they perform on a regular basis. External auditors also assess the internal control structures of their clients in areas other than financial statement audits. As Maijoor (1998) notes, accounting firms are providing more and more assurance services - such as systems reviews, risk assessments and control evaluations - as opposed to the traditional mix of audit and tax work. Despite the fact that auditors perform a lot of internal control evaluation, audit firms are not standardised in their approach to performing audits, including the internal control evaluation portion thereof. Studies which have reviewed audit firms' methodologies (Dirsmith and Haskins, 1991; Lemon, Tatum and Turley, 2000) note how some firms use a very structured approach while others adopt a more judgemental approach.

Confidence in the auditing profession worldwide is being undermined (Harrington and McCahey, 2002) due to the current spate of corporate collapses[1]. Also, on a global basis, the profession is still predominantly self-regulatory[2]. It would therefore appear to be an opportune time to examine one important facet of external auditors' work, namely evaluation of the internal control structures of their clients. It would appear beneficial to consider whether it is feasible to standardise the process, and to get practitioners to compare any such standardised model to their current audit firm procedures. The purpose of this study therefore is to develop a standardised model - from professional pronouncements and academic literature - that all auditors could use during internal control evaluation. The model is subsequently tested on practicing auditors who then compare it to current firm techniques.

LITERATURE REVIEW

The auditing profession worldwide has issued auditing standards to assist its members in performing internal control evaluations. These appear to recognise the major components of internal control structures identified in the models mentioned above (COSO, CoCo and Cadbury). A review of the relevant auditing standards on internal control issued by three separate professional bodies (in America, the United Kingdom and Australia[3]), demonstrates consensus as to the principal components, as noted in **Table 1**. A sub-division of the first major component of the UK standard into two sub-components (described in the standard) yields a three-component model which equates with the Australian model. Similarly, a sub-division of the first major component of the Australian model into three sub-components yields a five component model which equates with the US model[4]. For the remainder of this study, when referring to the principal components of internal control structure, the three components of the Australian model (**Table 1**) will be referred to.

TABLE 1: COMPARISON OF AUDITING STANDARDS: MAJOR COMPONENTS OF INTERNAL CONTROL

UK – SAS 300	**Australia – AUS 402**	**USA – SAS 78**
(1) Internal Control System, including	(1) Control Environment, including	(1) Control Environment
– Control Environment	– Risk Assessment	(2) Risk Assessment
– Control Procedures	– Monitoring	(3) Monitoring
(2) Accounting System	(2) Information System	(4) Information & Communication
	(3) Control Procedures	(5) Control Procedures

Academic journals incorporate many studies concerning internal control evaluation. A review of five researchers' attempts to model the evaluation process follows, with emphasis on the perceived limitations noted in their studies.

Emby (1994) attempted to evaluate the effect assessment of internal controls has on an auditor's decision as to how much substantive testing is to be performed. Auditors were initially asked to assess an internal control structure. Emby's approach is typical – as the following review of other studies will attest – of an apparent inadequacy in much of the research into internal control evaluation. His description of the internal controls over inventory concentrates primarily on the detailed methods and procedures adopted by the firm in this cycle (components 2 and 3 listed in **Table 1**, "Australian" column). He provides a brief overview of the company. The problem is that external auditors cannot assess internal controls for a particular cycle without firstly assessing the overall internal control environment of the whole entity (component 1 above). Consider the comments of Barr (1994) – a practicing auditor of 20 years experience – in assessing Emby's study:

> There was no insight into management competence and previously demonstrated integrity; ... no discussion of the expertise of those who had implemented the company's system. In short, very much of what I call "the good stuff" was missing. (p. 116)

Similar studies have received comparable criticisms. Gadh, Krishnan and Peters (1993) developed a prototype model for evaluating internal control systems, which, as Houghton (1993) argues, does not deal adequately with the control environment component of the entity's internal control structure: '[The model] does not attempt to evaluate the internal control environment - an area where most help is needed by practitioners' (p. 136).

Other models - Chang, Bailey and Whinston (1993), who developed what they termed an assumption-based truth maintenance system (ATM) to model auditor decision making on internal control environments, and Peters (1990), who developed a computational model that would generate risk hypotheses for account balances - can be similarly criticised. These models either ignored the control environment and the accounting/information system components or were deemed too narrow in focus.

Lea, Adams and Boykin (1992) developed a sophisticated conceptual model of the risk assessment process at the assertion level for account balances. This incorporated an evaluation of the internal controls using a bottom-up strategy (from transaction level to financial statements level). However, Smieliauskas (1992) comments that current audit practice usually assesses control risk in the opposite direction, not from the bottom up but from the top down.

Support for Smieliauskas (1992) is found in the Lemon et al. (2000) study referred to above. This notes how the business risk audit approach[5] is now predominant and this necessitates a review of threats to the overall business first.

Dirsmith and Haskins (1991) categorise studies in auditing into two sectors, structured (mechanistic) or judgemental (organic). The structuralists argue that structure can be effectively substituted for judgement. To this end they have therefore supported research in areas such as the development of complex decision aids for use in the audit process, one component of which is internal control evaluation (Peters, Lewis and Dhar, 1989; Wand and Weber, 1989). The authors of such studies have been self critical (for example, Peters et al., 1989). They commented on the complexities of their models and implementation problems. Dirsmith and Haskins (1991) also quote the problems encountered by an audit partner responsible for implementing an expert system in his audit firm's practice, describing it as attempting to quantify the unquantifiable and as under-representing audit judgement.

The above literature review indicates considerable research in the area of internal control evaluation. The review focuses particularly on the modelling thereof. But internal control structures themselves are subject to evolution, thus making the modelling process complex. Stringer and Carey (2002) studied the re-designing of internal controls in eight Australian organisations. Cohen, Krishnamoorthy and Wright (2002) note how increased emphasis on corporate

governance has led to various organisational factors, such as some elements of internal control, receiving greater attention. Porter, Simon and Hatherly (2003, p. 246) highlight the continuing difficulties of attempting to evaluate the relationship between the various components of an internal control model. In summarising the literature to date, it can be stated that the evaluation models developed appear to have some deficiencies. This is possibly because, as Felix (1998) highlights, they have been developed with other agendas in mind:

> Most research that has appeared in the last ten years with internal control content has been focused on auditor judgements rather than the use of enterprise internal controls in management or in auditing. (p. 8)

The possible limitations identified in the above models can be summarised as:

1. Not enough emphasis on the overall internal control environment of the entity, and too much focus on specific methods and procedures; and
2. Their complexity, and despite this complexity, they still may not address all pertinent factors, as the evaluation process is in itself extremely complex.

The model developed in this paper hopes to address the issues of these limitations.

DEVELOPMENT OF MODEL

The proposed internal control evaluation (ICE) model developed here has three components, derived from the principal components of internal control structure identified in AUS 402.10 (**Table 1**). Each of these, together with the individual elements which combine to make the component, is discussed below. A full copy of the ICE model is included in **Appendix 1**.

Control environment

The first component of the ICE model is the control environment, defined at AUS 402.04 as:

> The overall attitude, awareness and actions of management regarding internal control and its importance in the entity.

Paragraph 19 then lists the following seven elements that make up the control environment:

1. Management's philosophy and operating style (19a)
2. The organisational structure (19b)
3. The assignment of authority and responsibility (19c)
4. Internal audit (19d)
5. The use of information technology (19e)
6. Human resources (19f)
7. The audit committee (19g).

This first component of the internal control structure is critical, yet, as the literature review has noted, it has received little attention in previous models. Emphasis has usually been on the other two components of the internal control structure, the information system and control procedures. Yet, as AUS 402.17 highlights:

> A weak or ineffective control environment can undermine the internal control structure ... *and* ... strong individual control procedures cannot compensate for a weak control environment.

A study by Marden, Holstrum and Schneider (1997) appears to be the only study to place complete emphasis on the control environment section of the overall internal control structure. Not surprisingly, their study reinforced how critical the study of the control environment is. The limitation of their study is the fact that the authors then completely ignore the other two components of the control structure. The ICE model to be tested in this study will check all three components.

Reimers, Wheeler and Dusenbury (1993) in testing auditors' response modes also discovered the importance of the control environment component of internal control structure. Similarly, Wallace and Kreutzfeldt (1995) discovered the importance of control environment factors in audit decision making. Hence, as professional pronouncements and models (AUS 402, COSO, CoCo and Cadbury) and also the academic literature highlight the importance of control environment factors, it is proposed that this be the first component of any internal control evaluation model. Also, due to the weight of evidence from the review of modern audit trends (business risk auditing referred to above), it was considered valid to leave control environment as the first component.

The individual elements that auditors use to evaluate the control environment component of internal control must now be derived. Here again the professional and academic literatures concur. The seven elements the ICE model proposes to assess auditors' evaluation of the control environment are taken directly from AUS 402.19 as listed above. These seven individual elements may appear small, but they actually encompass consideration of at least 32 items. For example, when assessing the first element - management's philosophy and operating style - auditors are expected to assess the following items before making a decision:

1. Methods used to select accounting policies
2. Systems for monitoring and enforcing control procedures
3. The conscientiousness with which accounting estimates are developed. (AUS 402 19(a))

Hence the seven headings encompass a significant number of relevant issues that auditors need to assess. **Table 2** lists the seven elements and the individual items within each element that an auditor might use to assess them. Academic research also appears to support this categorisation. Studies that have assessed inherent and control risk factors (Kreutzfeldt and Wallace, 1990; Mock and Wright, 1993; Marden et al., 1997; Shailer, Wade, Willett and Yap, 1998) have also been included in the table. Where the study has assessed the same, or a similar, item to that listed in the standard, a "Y" has been included in the appropriate box.

TABLE 2 : INDIVIDUAL ELEMENTS OF THE CONTROL ENVIRONMENT AND ITEMS USED TO EVALUATE THEM

AUS 402	Shailer et al.	Mock/Wright	Kreut/Wall	Marden et al.
Management Philosophy (3)*	Y	Y	Y	Y
Selecting accounting policies		Y	Y	
Monitoring controls			Y	Y
Setting accounting estimates		Y	Y	
Organisational Structure (3)	Y		Y	Y
Domination of policy		Y	Y	
Providing information			Y	
Management experience		Y	Y	Y
Assignment of Authority (4)	Y		Y	Y
Delegation of authority			Y	
Risk management		Y	Y	
Management accountability				
Monitoring results			Y	Y
Internal Audit (7)	Y	E	Y	Y
Skills, experience, integrity, objectivity			Y	
Communicate with external audit, mgt, audit committee				
Use of IT (6)	Y	Y	Y	E
Segregation of duties				
Systems development				
Authorised use, amendment, processing, error detection				
Human Resources (4)	Y		Y	Y
Recruitment, training, discipline/counselling		Y	Y	
Performance based promotion				
Audit Committee (5)	Y	E	Y	Y
Experience, independence, involvement, appropriateness				
Interaction with Internal Audit				

* *number of items considered shown in parenthesis (in total 32)*
Y = included in study.
E = specifically excluded for practicality/relevance-to-study reasons

Information system

The second component of internal control to be evaluated is the information system. This is defined at AUS 402.08 as:

> The methods and records established to identify, assemble, analyse, calculate, classify, record and report the transactions and other events that affect an entity, and to maintain accountability for assets, liabilities, revenues and expenditures.

The information system component is listed in the three professional pronouncements shown in **Table 1**. Consider the individual elements that comprise this component. Standard procedures for evaluating computerised

information systems (CIS) environments (Watne and Turney, 1990) incorporate an approach such as initially evaluating the CIS "general"[6] controls and then evaluating the "application"[7] controls for each relevant transaction cycle or account balance.

These "general" CIS controls are listed in the former Australian Statement of Auditing Practice - AUP 4.1 - at paragraph 10, as in **Table 3**. In terms of the ICE model, these have already been assessed as part of the Use of Information Technology (AUS 402.19(e)) element of the control environment component of the model. **Table 3** demonstrates the parallel between the factors comprising the two elements.

TABLE 3: COMPARISON OF CIS "GENERAL" CONTROLS AND THE CONTROL ENVIRONMENT EVALUATION ELEMENT *"USE OF INFORMATION TECHNOLOGY"*

AUP 4.1 – Paragraph 10. "General Controls"	**AUS 402 – Paragraph 19(e) "Use of Information Technology"**
A. Organisational and Management Controls	(i) Appropriate segregation of incompatible functions
B. Application Systems Development and Maintenance Controls	(ii) Computer systems are development and maintained in an authorised and efficient way
C. Computer Operation Controls	(iii) Computer systems are used only for authorised purposes and
	(iv) errors are detected
D. Systems Software Controls	(v) Systems software is authorised, approved, tested, implemented and documented
E. Data Entry and Program Controls	(vi) Access to data and programs is authorised

"Application" controls, as defined at AUS 104, are listed at **Table 4**. Again, this list equates with the list of elements to be considered in evaluating the information system, as stated at AUS 402.20. The five headings in bold (in brackets in **Table 4**) are the proposed titles for each step in the evaluation process. It is proposed that this five-point matrix (matrix 1.2, **Appendix 1**) be used by auditors to evaluate the information system section of the ICE model.

A review of textbooks in the area (Cushing and Romney, 1987; Watne and Turney; 1990) supports the items listed above. Therefore, the five-point matrix constitutes the information system evaluation section of the ICE model. As with the seven elements of the control environment, consideration of these five points involves consideration of at least nine separate items of information processing systems as shown in **Table 4**. For example, evaluation of "database contents" necessitates identification of the following five factors: major transactions; how they are initiated; relevant accounting records; applicable documents; and relevant accounts in the financial statements.

TABLE 4: COMPARISON OF CIS APPLICATION CONTROLS AND FACTORS USED IN EVALUATION OF THE "INFORMATION SYSTEM"

AUP 4.1 – Paragraph 12. "Application Controls"	**AUS 402 – Paragraph 20 (a) – (d). "The Information System"**
Controls over **input**:	Initiation and input of transactions **(Data input)**
– Authorised	
– Accurately converted and recorded	
– Not lost, added, duplicated, improperly changed	
– Errors rejected and re-submitted	
Controls over **processing and files**:	Identifying major transactions, how initiated, and the accounting records, documents, and accounts in the financial statements **(Database contents)**
– Transactions properly processed	
– Transactions not lost, added, duplicated, improperly changed	
– Errors rejected and re-submitted	Processing of transactions **(Data processing)**
Controls over **output**:	Output of transactions **(Data output)**
– Results are complete and accurate	Inclusion of all transactions and events in the financial report **(Inclusion in financial report)**
– Restricted to authorised personnel	

A review of two studies in the information systems area, by Dirsmith and Haskins (1991) and Kreutzfeldt and Wallace (1990), also identifies these five items as important. Both studies list the five proposed element headings and then the factors used to assess them. Whereas the exact same terminology is not used, the concepts are similar.

Control procedures

The third component of internal control to be evaluated is control procedures. This is defined at AUS 402.05 as:

> those policies and procedures, in addition to the control environment that management has established to ensure, as far as possible, that *specific* entity objectives will be achieved. *(emphasis added)*

The auditing standards listed at **Table 1** and the accounting professions' COSO, CoCo and Cadbury models mentioned earlier all include it as a separate component of internal control structure requiring evaluation. This component refers to the policies and procedures in place in specific transaction cycles and other strategic areas of the audit entity. Paragraph 22 of the Australian auditing standard lists several examples of specific control procedures, which can be summarised into six elements as **Table 5** demonstrates.

It is proposed to use these six elements to form a six-point matrix, which provides a suitable framework for auditors to evaluate the control procedures component of internal control structure evaluation. Justification for using these elements is found by comparing them to audit texts[8] and noting their inclusion therein without exception. Also, these six elements are factors practicing auditors relate to and they simplify the process of reviewing all the individual methods and procedures employed in any transaction cycle or account balance.

TABLE 5: RECONCILIATION OF SIX-POINT "CONTROL PROCEDURES" (CP) EVALUATION ELEMENTS TO AUS 402 EXAMPLES OF CONTROL PROCEDURES

CP Evaluation Elements	AUS 402.22 (sub-paragraph reference in brackets)
Segregation of duties	Preparing reconciliations (a) * Approving reconciliations (a) * Maintaining and reviewing control accounts (d) * Maintaining and reviewing trial balances (d) *
Authorisation procedures	Authorising changes to programs (c) Authorising access to data files (c)
Independent checks	Comparing internal data with external sources (f) Checking arithmetical accuracy (b) Comparing financial results with budgets (i)
Physical controls – assets	Limiting direct access to assets (h) Comparing results of physical counts to records (g)
Physical controls – books & records	Limiting direct access to records (h)
Adequate documentation	Approving and controlling documents (e)

* = *Assuming reconciliations, control accounts and trial balances are prepared/reviewed by people independent of the preparation of the relevant books/records of prime entry*

As with the control environment and information systems factors, consideration of the six control procedures elements necessitates the consideration of several items that combine to make up the listed elements. In this instance, at least 13 possible items (**Table 5**) need to be considered to fully address the six listed elements. Not all will be relevant in each instance, but the standard attempts to give a general framework to cover all possible items and auditors are to tailor their approach accordingly. Hence, consideration of the six elements should provide the auditor with sufficient appropriate evidence to form an opinion on the adequacy or otherwise of this component of internal control.

COMPLETION OF ICE MODEL

The proposed ICE model has been developed essentially by identifying three components of an internal control structure evaluation (control environment, information system and control procedures) and the elements used to evaluate them. The components/elements have been highlighted in professional pronouncements worldwide and their inclusion has then been further justified by support from academic studies as appropriate. The ICE model differs from the Australian Auditing Standard in that it states (i) the order in which it wishes the three components to be assessed and (ii) the recording mechanism (numeric) to be utilised. Neither of these is specifically prescribed in AUS 402.

As with current trends in business risk auditing (discussed above) the auditor would commence by identifying the most significant risks/threats facing an entity. The entity's most significant accounting areas ("transaction streams" or whatever term a particular auditor wishes to incorporate) would then be identified (referred

to from hereon as SAAs (significant accounting areas). One ICE model form (as in **Appendix 1**) would then be completed for each SAA.

Information for matrix 1.1 would be obtained from the knowledge of the business section of the audit files and from any permanent client data files the auditor keeps. Information for the other two matrices would be derived from a client's accounts and procedures manuals and discussions with appropriate staff. Having completed the first three matrices and assessed all the information necessary to evaluate elements in the above matrices[9], the auditor can now conclude on the SAA. This can be done by completing matrix 1.4 and then adding a brief narrative note to summarise. For financial statements audits, the auditor has now completed and documented the assessment of control risk, and can now decide upon how much control testing or substantive testing is necessary in each specific area. For assurance type engagements, such as overall review of the adequacy of internal controls, the auditor can gather the ICE forms completed for each SAA and thus obtain a comprehensive view of the reliability or otherwise of internal controls in the overall organisation.

One final question relates to how the model's elements are to be evaluated. Referring to **Appendix 1** the ICE model uses a 9-point numeric scale. Much has been written in audit literature concerning the use of numeric as opposed to linguistic scales in audit evaluations[10]. Auditing standards permit the use of either. For example, the American auditing standard SAS 78 states audit risk may be assessed in "quantitative or non-quantitative" terms. The potential problem with linguistic expressions (Chesley, 1986; Rapoport, Walsten, Erev and Cohen, 1990; Reimers, 1992) lies in the uncertainty of their interpretation. Based upon the above it was decided that all elements to be evaluated in the ICE model should be evaluated using a numeric scale[11].

HYPOTHESES DEVELOPMENT

H(1–5): Auditors will rate the ICE model the same as their current firm internal control evaluation model in terms of "time to complete"(H1), "cost of use"(H2), "completeness"(H3), "logical development"(H4) and "overall usefulness"(H5).

The hypotheses tested relate to the users' assessment of the ICE model, a prototype evaluation model, extracted from professional pronouncements. Lea et al. (1992, p. 153) note how current auditing standards require the auditor to consider control risk at both the assertion level and account balance level. However the standards then provide virtually no guidance as to how these risk assessments are to be structured.

The subjects in this study evaluate the internal control structure using two methodologies, a structured matrix approach (the ICE model) and their own firm approach. The order was balanced, half doing ICE first the other half doing "firm" first[12]. It is possible practicing auditors will find the ICE model preferable to current methods of recording internal control evaluation, due to its close parallel with the auditing standards and its adherence to structure. Conversely, if subjects

prefer a less structured (judgemental) approach, they may prefer their current firm's methodology. Familiarity with their current firm's methodology may also lead participants to consider the proposed model less preferable, simply because they are not used to it. Due to the range of possibilities, hypotheses H1–5 have been stated in the null form, i.e. it is anticipated subjects will find the ICE model no better than - but no worse than - current firm internal control evaluation techniques in terms of four specific factors namely, time necessary for completion; cost of implementation; completeness; and logical development, and ultimately in terms of its overall usefulness. These four factors were selected after reviewing literature concerning audit firm methodologies[13]. It was considered that these factors best summarise the varying ways researchers have summarised diverse methodologies.

METHODOLOGY

It was decided that at least 90 auditors were needed[14] in order to draw realistic conclusions from the test results. To be deemed appropriate, the subjects selected had to have had at least 18 months of practical audit experience with an audit firm (as this was considered the minimum necessary to provide adequate internal control evaluation experience). Two of Australia's Big Five accountancy firms, one state Auditor-General's (AG) office and two large second tier firms (having branches in at least four states) agreed to provide appropriate subjects. Two firms were able to run the experiment as part of a firm training seminar. Three volunteered to have them completed via internal mail[15]. Each subject was sent a copy of the survey instrument (**Appendix 1**) with instructions to return them to the researchers (aggregate response rate for the mailouts was 36 per cent).

The subjects were given a four page description of the internal control structure of a fictitious entity, such as they would obtain during a real audit from audit files and discussions with client etc[16]. The description included one and a half pages of "Knowledge of Business" information and two and a half pages of accounting procedures over one SAA - purchase ordering/receiving. They then performed two evaluations of the internal control structure for that SAA, using the standardised ICE model approach (matrices 1.1 to 1.4 in **Appendix 1**) and their current firm evaluation techniques (matrix 2 in **Appendix 1**).

As all firms carried out their audits in accordance with the Australian Auditing Standard, they were asked to summarise their firm evaluation method by evaluating the three components of internal control identified in the AUS and then give an overall evaluation. Such a framework would be familiar to them. However, how they arrived at the reliability rating they gave to a component using the firm method may have been completely different to how they arrived at a rating using the ICE method. They may have considered some or all of the elements listed in the ICE matrices, or they may have considered additional elements and used checklist templates or other software tools. They may have considered the elements individually or in total before arriving at a final rating. Matrix 2 simply summarises the results of their deliberations using current firm procedures. Each

firm has differing techniques[17]. Confidentiality constraints precluded the researchers from obtaining descriptions of exactly how the firms evaluated internal controls. However, all five acknowledged that they adopted a business risk based approach to their evaluation processes. This included a focus on control environment factors as a critical part of the assessment. All employed software packages with pop up menus of items to evaluate in assessing each stage of the process. Firms appeared to differ in how structured the recording of these evaluations was. For example, some were more structured and required regular recording of assessments, whereas others were less structured and were content with an overall memo at the end. Hence, all evaluations would be similar to ICE in terms of content, while they may have differed in terms of recording. The scaled recording mechanism of ICE enabled comparability of evaluations. Finally, the respondents compared the ICE model method to current firm procedures across the four variables listed earlier and then made an overall comparison.

RESULTS

The hypotheses (H1–5) were tested individually by getting the respondents to rate the ICE model, in comparison to current firm procedures, across the four variables (time to complete, cost, completeness, logical development) and, finally, overall. By comparing the mean score (on a scale of 1 to 9) provided by respondents to the mean score of the 9-point Likert scale, i.e. 5, each hypothesis could be tested individually. **Table 6** summarises the responses by firm (sample sizes in brackets) and overall. In 25 of the 30 cases, there is no significant difference between the reported mean and the mid-point (5); asterisks denote the five significant differences.

The most significant finding in **Table 6** is in the "overall" column. Each individual firm, and the 94 auditors as a group, considered the ICE evaluation model to be as good as current firm procedures. This finding strongly supports the external validity of the study and allows results to be analysed with confidence, as the subjects appear to consider the model to be realistic and usable. As mentioned earlier, audit firms differ in terms of how their internal control evaluation methodologies operate. Five audit firms, ranging in size, were utilised in the current study, yet there was no significant difference in their evaluations. They considered the ICE methodology to be as good as current firm procedures in terms of overall application.

TABLE 6: COMPARISON OF ICE MODEL TO CURRENT FIRM EVALUATION PROCEDURES

Audit Firm	Descriptive Variables Comparing ICE to Firm Procedures (Mean Score: <5 = not as good, 5 = as good, >5 = better than)				
	Time (H1)	Cost (H2)	Complete (H3)	Logic (H4)	Overall (H5)
Big Five 1 (20)	4.94	5.50	5.12	5.13	5.19
Big Five 2 (23)	5.43	5.10	4.26 *	5.65	5.00
AG (25)	5.52	5.60 *	4.60	5.12	5.04
Second Tier 1 (13)	5.31	5.50	4.23 *	4.54	4.62
Second Tier 2 (13)	5.33	5.73	5.00	5.42	5.42
Total group (94)	5.33	5.46 **	4.62 *	5.22	5.04

* = *significant at 95 per cent level*
** = *significant at 99 per cent level*
t-scores in ***Appendix 3***

Considering the four individual qualities of the ICE model, all firms and the group as a whole saw no significant difference in terms of the time involved in using the model (mean score of 5.33). Subjects were asked to record their actual times when performing the evaluations as an additional check on this quality[18]. Overall the order was balanced[12]. **Appendix 2** summarises the pair-wise comparisons. Only 65 of the 94 participants recorded all four times. The average time under the ICE method was 9.12 minutes as opposed to only 7.43 minutes using current firm procedures. 36 respondents performed the evaluation using their current firm evaluation method first and then the new ICE evaluation method. As **Appendix 2** demonstrates, these participants recorded no significant difference between the times taken for each evaluation (8.89 minutes as opposed to 8.72 minutes). This contrasts significantly with the results of those who performed the ICE evaluation first. Referring again to **Appendix 2**, these participants (29 of them) took on average 9.41 minutes to complete the evaluation using the ICE method as opposed to 5.83 minutes using their firm methodology. However, their second evaluation was of an entity they were now familiar with (having just evaluated it using the ICE method) and they were now using an evaluation method they were also familiar with; it therefore took significantly less time.

However, when assessing at the end of both evaluations (H1, **Table 6**) how they compared in terms of time to complete, auditors appeared to accept that, even though the ICE evaluation took longer this time, they could envisage how in general it would not take significantly longer (or shorter). Two factors probably explain this apparent contradiction between the result as per **Appendix 2** (the bottom two tables showing a significant difference) and **Table 6** (H1 showing no significant difference). First, because ICE was new to the participants, a familiarisation process may have taken place. Second, in practice, using their firm model, it is probable they would have a lot more to do than just rate four variables. Means for four of the five firms (when comparing the time factor in **Table 6**) were greater than five, as was the group mean.

Similarly, as a group the auditors considered there was no difference as regards logical development between the ICE model and current procedures (mean 5.22). As regards "cost of use" the auditors of one firm (AG) considered, at a

level that was statistically significant, that the ICE model would be cheaper to use than current firm methodology and the effect of this evaluation was to make this finding significant for the group as a whole as well (mean 5.46).

The only criticism of the model was in relation to its completeness. Two firms (BF2 and ST1) considered the ICE model to lack the completeness of their current firm procedures and the effect of these evaluations was to make this finding significant for the group as a whole as well. A review of subjects' individual comments was unable to expand upon this finding, as to specifically where the model lacks completeness. However, as the subjects of both firms rated the ICE model to be as good as their current procedures in the "overall" rating, they cannot have considered the omissions to be so serious as to undermine the model's whole validity.

Hypotheses H1, H4 and H5 can be said to have been supported, as regards the two individual qualities of "time to complete" and "logical development" and the most significant factor, its "overall usefulness". But hypotheses H2 and H3 were not supported, for the two qualities of "cost of use" - some users considering the ICE model cheaper to operate than current procedures - and "completeness" - some users considering the ICE model not to be as complete as current procedures.

Additional evidence as to the validity of the study was obtained by comparing the means of the reliability scores the subjects assigned to the three component scores and the overall evaluation, using both methods, ICE and firm. Four comparisons were made for each of five firms, and for the group as a whole, yielding 24 pair-wise comparisons in total. Of the 24 comparisons, auditors yielded a consistent result in 22 cases[19]. *This consistency of results, using two different* evaluation methods, adds to the validity of the ICE method.

SUMMARY AND CONCLUSIONS

This study has developed a standardised internal control evaluation model (the ICE model) from professional pronouncements worldwide and from building on the perceived limitations of previous models developed in academic studies. When tested on 94 practicing auditors from five different audit firms, the new model was considered to be as good as current firm methods of internal control evaluation.

Many sections of this study have commented upon the different methodologies employed by different audit firms in their internal control evaluation processes. The ICE model reviewed here appears to provide a standardised workable model all auditors could use - irrespective of firm affiliations - to evaluate the internal control structures of their clients. Consensus levels (gauged by reviewing the lack of variance in means reported in **Table 6**) appear satisfactory, as the results from any individual firm were not significantly different from those of the group as a whole. Similarly, the results achieved using the ICE model were found to be predominantly consistent with the results they obtained using their current firms' evaluation methods.

In developing the ICE model, its proposed benefits (namely how it addresses the limitations identified in previous models) were expounded. First, significant

recognition was given to the control environment component of internal control structures. As a group, the subjects considered the model to be "logically developed"; this adds tacit support to the notion of the control environment being a critical component and probably the one to be evaluated first, in line with current business risk audit methodology. Second, while attempting to address all critical factors of internal control evaluation, the model is not complex. Again as a group, the subjects did not consider the model more time consuming or expensive to use than current procedures. Finally, and most important of all, their overall assessment of the model was that it was as good as current firm procedures.

The subjects' only criticism of the model was a lack of completeness in some areas. In practice it would appear that supporting schedules would be necessary to validate the responses given to some evaluations in the ICE model. This is an area which would benefit from future research as to specifically which other items these auditors considered should be included.

The overall results of this study would tend to suggest that a workable model for internal control evaluation, usable by all auditors irrespective of firm, is feasible. Therefore, it would appear a valid pursuit to attempt to ascertain the perceived weaknesses of this model and continue in attempts to develop a standardised model. Evidence of standardisation in the auditing profession may act as a guard against criticism of the methodologies of individual auditors and their firms. The argument to maintain self-regulation may therefore be strengthened.

The current study has its limitations which may pave the way for other areas of future research. First, by placing the control environment component first, it could be argued this has a primary effect upon those completing the overall evaluation and that it could "swamp" subsequent information. Much has been written in audit literature concerning "order effects"[12]. To test for order effects would have necessitated a much bigger sample size for this study (180 - being 3 x 2 x 30 - experienced auditors). However future studies could change the order in which the components were presented for evaluation to see what effect this has on evaluations. Second, the ICE model has only been tested on one SAA. Whether it would work as well on all others needs to be tested further. Third, as mentioned above, subjects may have used additional questionnaires, templates, etc. before recording their score for any individual element. However, the practical problems associated with performing the experimental tasks prohibited proper testing of this possibility. This has been recognised as a fruitful area for future research.

NOTES

1 As evidenced for example in the United States by *Enron, Sunbeam* and *WorldCom*, and in Australia by *HIH, Harris Scarfe* and *One-Tel*.

2 Refer for example to Gill, Cosserat, Leung and Coram (1999) for a breakdown of the audit regulatory environment in Australia. The US and UK have similar environments.

3 *SAS 78 - Consideration of Internal Control in a Financial Statement Audit* (American Institute of Certified Public Accountants (AICPA), 1998); *SAS 300 - Accounting and Internal Control Systems and Audit Risk Assessment* (Auditing Practices Board (APB),

1995); and *AUS 402 - Risk Assessments and Internal Controls* (Institute of Chartered Accountants in Australia (ICAA), 1996) respectively.

4 These sub-divisions are supported by the appropriate definitions of components (and their constituent elements) inherent in each standard.

5 The business risk approach operates on the premise that considering the business as a whole is more likely to generate insights that are relevant to the ultimate audit opinion, than one which is narrowly focussed on the financial statements alone (Lemon et al., 2000, p. 10).

6 These are defined in Australian Auditing Standard AUS 104 - Glossary of Terms as: Manual and computer controls affecting the overall computer information system, to provide a reasonable level of assurance that the overall objectives of internal control are achieved.

7 These are defined in AUS 104 - Glossary of Terms as: Specific controls over the accounting applications to provide reasonable assurance that transactions are authorised and recorded, and are processed completely, accurately and on a timely basis.

8 Three standard texts, namely Arens et al. (2002), Gill et al. (1999), and Pound, Gay and Simnett (1997) were selected.

9 Supporting schedules - or software templates - on which the auditor has assessed all the relevant factors for each element can be cross-referenced to the appropriate element of the ICE model, justifying the rating given.

10 Refer for example to Janell and Wright (1991).

11 Whittington and Margheim (1993 p. 55) used a 9-point Likert scale, anchored with the words "not reliable" and "very reliable", in a study of external auditors' evaluations of internal audit departments. As both the subject matter and experimental design were similar to this study it was decided to use a 9-point Likert scale.

12 Anderson (1981) describes order effects as the phenomenon whereby the same variables can result in a different judgement or decision, depending upon the order in which the variables are presented. For a summary of such studies refer to Trotman and Wright (2000).

13 In chronological order the following studies all address audit firm methodologies: Stringer (1981), Joyce and Libby (1982), Cushing and Loebbecke (1986), Dirsmith and Haskins (1991) and Lemon et al. (2000).

14 Actual numbers provided (94) are summarised at **Table 6**. Subjects ranged from audit senior to manager level with experience ranging from 18 months to 15 years.

15 Although the use of two methods of data collection is obviously not ideal, it was the optimal way to ensure the appropriate number of quality subjects. A subsequent ANOVA analysing the overall evaluation of internal control structure revealed no significant difference between the results of the five firms ($F = .638$), suggesting that the data collection method used did not cause any variation. Subjects performing the evaluations at training seminars were supervised by one of the researchers. The researchers have no reason to believe those who did it by mailout would have answered differently under supervision. Similarly, there was no reason to consider that responses of non-respondents would have differed from those who did reply, as there was nothing to gain by answering in any perceived "appropriate" manner.

16 A pilot test was performed using five auditors, average experience 3.5 years, from a Big Five accounting firm. They considered the survey instrument (SI) satisfactory and after some minor adjustments the final SI was derived.

17 Again referring to note 15 re overall evaluation of the internal control environment, significant differences were not noticed between the firms. Similarly, the results of

comparisons in **Table 6** do not indicate any major fluctuations between the results of firms.

18 The researchers could thus further test for possible order effects when assessing the "time to complete" factor. It was considered highly unlikely that assessment of the other three factors would have been affected by the order in which they were assessed, due to their nature, so these were not subjected to any order effect testing.

19 Using a Bonferroni procedure to control for an inflated family-wide type 1 error (Neter, Wasserman and Kutner. 1985), the significance level was set at 99.79 per cent (.05/24). The only two significant differences were for the group as a whole in their evaluation of control procedures and overall (see below). Interestingly, in both cases they considered the structure more reliable using the firm method, possibly as they only filled in one overall score as opposed to the ICE method where they had ranked each individual item first and then assigned an overall score.

Audit Firm	**Variables: Pair-wise Comparison**	**ICE mean**	**Firm mean**	**t**
Total group (n = 94)	Control Environment	6.10	6.24	n/s
	Information Systems	6.12	6.21	n/s
	Control Procedures	5.69	6.04	*
	Overall Internal Control Structure	5.74	6.10	*

APPENDIX 1

SURVEY INSTRUMENT (ABRIDGED VERSION) – (INCLUDES INTERNAL CONTROL EVALUATION (ICE) MODEL).

Please read all the relevant company information. Please now assess the internal control structure for the relevant transaction cycle by circling the appropriate numbers in each of the following four (4) matrices.

Internal control evaluation form (ICE form)

Client/Division:	**Prepared by:**	**Sch Ref:**
Transaction cycle: Purchase Ordering/Receiving	***Reviewed by:***	**Period end:**

(1.1) The control environment

	Unreliable			Moderately Reliable				Highly Reliable	
Management philosophy and operating style	1	2	3	4	5	6	7	8	9
Organisational structure	1	2	3	4	5	6	7	8	9
Assignment of authority and responsibilities	1	2	3	4	5	6	7	8	9
Internal audit	1	2	3	4	5	6	7	8	8
Use of IT	1	2	3	4	5	6	7	8	9
Human resources	1	2	3	4	5	6	7	8	9
Audit committee	1	2	3	4	5	6	7	8	9
Overall assessment of Control Environment	1	2	3	4	5	6	7	8	9

(1.2) The information system

	Unreliable			Moderately reliable				Highly reliable	
Database contents	1	2	3	4	5	6	7	8	9
Data input	1	2	3	4	5	6	7	8	9
Data processing	1	2	3	4	5	6	7	8	9
Data output	1	2	3	4	5	6	7	8	9
Inclusion in financial report	1	2	3	4	5	6	7	8	9
Overall assessment of Information System	1	2	3	4	5	6	7	8	9

(1.3) Control procedures

	Unreliable			Moderately reliable				Highly reliable	
Segregation of duties	1	2	3	4	5	6	7	8	9
Authorisation procedures	1	2	3	4	5	6	7	8	9
Independent checks on performance	1	2	3	4	5	6	7	8	9
Physical controls over assets	1	2	3	4	5	6	7	8	9
Physical controls over books and records	1	2	3	4	5	6	7	8	9
Adequate documentation	1	2	3	4	5	6	7	8	9
Overall assessment of Control Procedures	1	2	3	4	5	6	7	8	9

(1.4) Overall evaluation

Overall what is your evaluation of the internal control structure in the Purchase ordering/receiving transaction cycle:

	Unreliable			Moderately reliable				Highly reliable	
Overall Evaluation of Internal Control Structure	1	2	3	4	5	6	7	8	9

Comments:_____

_____

(2) Current firm procedures for evaluating internal controls.

Using your audit organisation's current procedures (manuals, software, templates etc) evaluate the internal control structure.

	Unreliable			Moderately reliable				Highly reliable	
Control Environment	1	2	3	4	5	6	7	8	9
Information System	1	2	3	4	5	6	7	8	9
Control Procedures	1	2	3	4	5	6	7	8	9
Overall Evaluation	1	2	3	4	5	6	7	8	9

APPENDIX 2

COMPARISON OF TIME TAKEN TO PERFORM ICE AND FIRM EVALUATIONS

*Paired samples statistics – **total group** (less missing data)*

		Mean	N	Std. Deviation	Std. Error Mean	Sig. (2-tailed)
Pair 1	Time ICE	**9.12**	65	7.16	.89	
	Time firm	**7.43**	65	9.33	1.16	**.025***

*Paired samples statistics – **firm first, ICE second***

		Mean	N	Std. Deviation	Std. Error Mean	Sig. (2-tailed)
Pair 1	Time ICE	**8.89**	36	8.00	1.33	
	Time firm	**8.72**	36	11.26	1.88	**.857 n/s**

*Paired samples statistics – **ICE first, firm second***

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Time ICE	**9.41**	29	6.10	1.13
	Time firm	**5.83**	29	5.96	1.11

Paired samples test

		Paired Diff					t	df	Sig. (2-tailed)
		Mean	Std. Dev'n	Std. Error Mean	95% C. I. of the Difference				
					Lower	Upper			
Pair 1	Time ICE – Time firm	3.59	6.03	1.12	1.29	5.88	3.204	28	**.003****

***n/s** = not significant, * = significant at 95 per cent, ** = significant at 99 per cent*

APPENDIX 3

COMPARISON OF ICE MODEL TO CURRENT FIRM EVALUATION PROCEDURES. T-SCORES: (REFER TABLE 6)

	Descriptive variables comparing ICE to firm procedures				
Audit Firm	Time (H1)	Cost (H2)	Complete (H3)	Logic (H4)	Overall (H5)
Big Five 1 (20)	–0.15	1.14	0.27	0.33	0.61
Big Five 2 (23)	1.33	0.40	–2.25*	2.05	0.00
AG (25)	1.76	2.12*	–0.95	0.44	0.17
Second Tier 1 (13)	0.69	1.03	–2.24*	–1.38	–1.32
Second Tier 2 (13)	0.57	1.89	0.00	1.16	1.33
Total group (94)	1.97	2.98**	–2.17*	1.42	0.38

** = significant at 95 per cent level, ** = significant at 99 per cent level*

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