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2

Analytical Auditing: A Status Report

Rodney J. Anderson

Clarkson, Gordon & Co.

The purpose of this paper is to provide: a) a brief overview of the historical development of "Analytical Auditing," b) the reasons which underlay that development, c) the purpose of certain modifications introduced in subsequent years, and d) an evaluation of the use of analytical auditing in practice today.

Analytical auditing is a systems-oriented approach to that portion of the auditor's annual audit which involves the study and evaluation of internal control. It is based on flow chart analysis supported by appropriate additional compliance verification procedures. It is not the purpose of this paper to explain the approach in detail, for it has already been comprehensively documented in the literature.¹ Rather, the purpose is to comment on past and present trends and to cast an eye to the future.

Where Does Analytical Auditing Fit in?

Generally accepted auditing standards² imply a division of the program for the recurring annual audit into a) a review and evaluation of internal control together with testing of transactions and b) a gathering of other evidence to support the audit opinion. I shall refer to the first stage as the "interim audit" (various practitioners use various names). I take the objectives of the interim audit to be the following:

- 1) To determine the accuracy and reliability of the accounting records and the appropriateness of the accounting methods followed in order to provide a basis for planning the timing, nature, and extent of the substantive procedures necessary to support an opinion on the financial statements through a) Review and evaluation of the accounting system and other relevant internal controls, and b) Compliance verification of the existence, effectiveness and continuity of operation of those controls on which reliance is to be placed, or substantive verification of internal evidence.
- 2) To perform those substantive procedures which can most usefully be commenced at an interim date. (Ref. h), Vol. 1, p. 297.)

There are various strategies by which one can accomplish this interim audit objective. The two principal strategies may be referred to as the systems-oriented approach and the data-oriented approach. The former places its primary emphasis on auditing "through" the system and understanding how the system

works. The latter places its primary emphasis on testing the results of the system and establishing the degree of accuracy of those results. Of course, these oversimplifications are extremes and in practice any systems-oriented approach will include important tests of data and any data-oriented approach will include important analysis of systems. The difference is one of emphasis.³

If one were to opt for the systems-oriented approach to the interim audit there are again various ways in which one could proceed to study the system, document one's study, analyze that documentation in order to evaluate internal control, etc. One of these ways is the "analytical auditing" approach. Any interim audit approach must contain **review** techniques (finding out what the system is) and **evaluation** techniques (deciding whether the system is any good).⁴ Analytical auditing⁵ uses a) a combination of flow charting and limited tests of transactions as review techniques, b) a combination of flow chart analysis and internal control evaluation guides as evaluation techniques, and c) appropriate additional compliance and substantive verification procedures.

Reasons for the Initial Experiment

Within Clarkson, Gordon & Co.⁶ the experimentation which led to analytical auditing began in 1960, but about the same time others were also experimenting with possible flow charting approaches (see Refs. a) and c)).

What were the reasons for this experimentation? I can only speak from my own personal viewpoint, but perhaps others had similar experiences. A major factor was the frustration of trying to relate the quantities of detailed checking we had all customarily been doing to our stated objectives of designing audit tests related to our evaluation of internal control. At this point it may be helpful to point out that the profession in Canada had grown out of a slightly different background than in the United States. In Canada, auditing had originally been founded on the concept of a detailed checking of all transactions. When it became clearly impractical to check an entire year's transactions, Canadian auditors began to check one month per quarter, and eventually this was reduced to one month per year. When I was training as a junior, the normal practice was to check one month in its entirety—the month to be tested being selected randomly each year (although there was on occasion a certain sameness in the month selected—May one year, June the next, May the next, and so on).

In contrast, I sense that the development of auditing in the United States was more from the starting point of creditor-oriented "balance sheet" audits which later came to be supplemented by tests of transactions. Thus, our two countries may have approached the testing of transactions question from the opposite extremes.⁷

In any case, in Canada, with the memories of 12-month detailed testing still fresh in the minds of the partners who were overseeing us, we rationalized checking less than the entire year on the grounds that we were placing reliance on internal control (statistical sampling ideas were not yet widely in vogue). We all knew that we were supposed to test more if internal control was poor and less if internal control was good. However, the fact is that we often filled out the internal control questionnaires as the last step in the audit (on the bus

ride back to the office). After all, before conducting the various tests we just did not know enough about the details to be able to answer the questionnaire anyway. In any case, whether the answers to the questionnaire were good or bad, we usually ended up testing one month of transactions. In short, we all paid lip service to relating the design of tests to our evaluation of control but none of us knew very well how to put this concept into practice. That certainly was one of the frustrations.

Another one was the sheer problem of knowing enough to be able to test the transactions intelligently. I can remember sitting down with a stack of 300 invoices and being told to vouch them. I did not have a thorough understanding of how the business operated, nor of what sort of expenditures one could reasonably expect to be made, and therefore what criteria one should use in deciding whether the documentary support for such expenditures was reasonable. Anyway, there was not much time to worry about this sort of question if one was going to get through the 300 invoices in a reasonable length of time. One just started looking at the pieces of paper hoping that after a while some sort of pattern would emerge and that at least the last few would be audited more intelligently than the first.

Of course, I am overstating the case. I do not mean to imply that auditors were myopic until analytical auditing came along or that those who use different approaches today do not do thoughtful and conscientious work. I am merely trying to describe some of the frustrations with what at that time was our transaction-oriented approach. These frustrations (together with fee pressures from our clients) led us to experiment with alternative techniques.

We felt there had to be a better way of focusing on an understanding of the system and relating that understanding in a more direct manner to the choice of what we tested.

Historical Overview

During the next two years (1960 to 1962) we experimented with a number of different methods for studying systems and for documenting our study. In some audits we produced whole libraries of systems notes which had to be typed if anyone was going to hope to read them. The problem was that a third of these notes would be obsolete the following year and patchwork revisions were not very intelligible. On other audits we tried various flow charting approaches, but in many cases our flow charting was completely undisciplined with every staff member having an individual style, that was often undecipherable to anyone else. After two years of experimentation we decided that it was essential to settle on a standard style of flow charting and we picked one with a horizontal layout for reasons which I will mention in a minute.

In 1962 the prototype of the analytical audit approach was field-tested on 72 audits across the country. The technique was still nameless and the few of us working on the experiment came to be known snidely as the U-2 squad—an allusion to the bad publicity which had recently been attracted by the ultra-high U-2 flights which President Eisenhower had been sending over Russia. We did not think that “U-2 auditing” would have much sales appeal and finally settled on the name “analytical auditing” to refer to the emphasis on systems analysis.

With a new name, and a few minor revisions suggested from our field tests (the introduction of "outline charts" was one of them—see Ref. e), p. 39), we began an extensive period of staff training. In the same year, the approach was documented in an article in *The Canadian Chartered Accountant* (Ref. b).

In 1964 we saw the beginning of our full-scale conversion to analytical auditing (for audits over a certain minimal size) across the firm and in that year we also began analytical auditing courses for internal auditors of our clients. Staff training was significantly expanded in 1965 and comprehensive in-house manuals were developed for our staff. Some of the material from these manuals and from our staff training courses was incorporated into the book, *Analytical Auditing*, published in 1966 (Ref. e).

Throughout this period the development of EDP systems was accelerating. *Analytical Auditing* had given an introduction to the use of this approach in EDP systems (Ref. e) Chapter 9) but it was soon apparent that more guidance was needed in this complex area. In 1967 the analytical auditing techniques were incorporated into our video-taped computer auditing course—which was for a number of years to form part of the computer auditing courses offered by the Canadian Institute of Chartered Accountants. In 1968 the Canadian Institute began giving its own separate analytical auditing courses and these have continued for the past decade.

For the next seven years the approach was continued without major revision. No doubt various annual revisions of forms were made, most of which I no longer remember, and other modifications were made as we continued to gain experience with the application of the approach to computerized systems; however, the basic outline continued the same. From time to time there were public discussions of the approach.⁸ Then, in 1975 we concluded it was time to make some significant modifications with the introduction of the by-then current concept of compliance verification. I will discuss the significance of these modifications shortly. The resulting revised format was incorporated in our textbook, *The External Audit* (Ref. h), published last year.⁹

The Initial Analytical Auditing Format

In the initial format, as described in the first article and in *Analytical Auditing*, the basic approach was as follows. The accounting system as a whole was divided into logical component systems—usually sales-receivables-receipts, purchases-payables-payments, salaries and wages, cost records, and general. This division we still use. Within each section the systems, or those portions of the systems, relating to important control points were summarized on flow charts, the flow charts merely being updated in succeeding years. To make sure we were not wasting time documenting the blueprint of a system which in fact had never been in force, we tested our understanding of the system by "walking through" four or five transactions along each path of the charted system from cradle to grave, checking related books, documents, and records and confirming procedures with the employees involved along the way. This walk-through audit can be conveniently summarized on the flow charts as well.

At that point, the flow charts were then analyzed. We have found that the flow charts themselves facilitate the detection of control weaknesses and

systems inefficiencies. Studying a flow chart and asking yourself what would happen if this shipping document were misplaced or if that entry were recorded incorrectly and then searching for the possible consequences (such as a check of serial continuity of shipping numbers that would fail or some control account reconciliation that would be out of balance) is one of the best ways of detecting the presence or absence of key controls. Moreover, the horizontal charting format employed, wherein each column represents an individual department or employee, helps to focus on controls related to the division of duties.¹⁰

The analysis of the flow charts led to two results: the identification of potentially weak areas and the identification of areas where efficiency could be improved. A "weakness investigation" was then designed to determine whether a material error had occurred because of the control weakness. Just because there is a hole in the net does not mean that any fish swam through it, but it is worthwhile checking to see. And if I have only a limited amount of audit time to deploy (and in the economic world this is always so) it will be more useful if I concentrate a lot of it on those discovered holes in the net and spend correspondingly less time in the checking of other areas where the net seems strong.

This, then, was the main answer to the early frustration of having no organized way of relating testing work to control conclusions. The flow chart analysis and walk-through audit flagged the apparently weak areas, and testing work (or other auditing procedures) was then concentrated on those apparent weaknesses.

But we went one step further. We argued that there should be some cyclical testing of those areas where control appeared strong. After all, in our walk-through audit we had tested only four or five items. I do not pretend that the four or five is significantly different from one (the Stettler "sample of one" idea). The only reason for picking four or five was to have some added opportunity to avoid mistaking the particular for the general.

But were four or five enough? Well, it must be remembered that this was not just four or five transactions in total but rather four or five transactions along every path of the system—that is, four or five transactions of each type which would be handled in a different way. Moreover, a system with good internal control has a self-policing nature which will tend to catch most errors more efficiently than does the external audit. A useful audit objective was therefore to prove that the self-policing system was there, not to do the policing over again (you don't hire a dog and then do the barking for it). The transactions tested were combined with observations of the employee procedures in practice, discussions with those employees, review of open files, etc. To assume that all the different employees with whom we talked were in a conspiracy to deceive us, that the files were reviewed happened accidentally to support that conspiracy, and that the four or five documents we tested happened also to wrongly confirm the misleading story, seemed a pretty far fetched risk. In short, we believed that our primary assurance was obtained from the discussions, the observations, and the walk-through procedures.

Nonetheless, we realized that there was a danger in never conducting any more extended tests. Accordingly, for supplementary insurance, the original version of analytical auditing called for "supplementary tests" to be carried out

on a cyclical basis over a number of years. In any one year a number of key points in each systems component would be tested extensively, but not every point would be tested each year. Better to test a few and test them well than to test them all but poorly. It was like drilling for oil. One didn't have to send a hole down on every square inch of the field. But for those holes which one selected to drill, the hole had to go at least deep enough to catch the oil if it were really there.

This, then, was the original version of analytical auditing—thorough systems analysis and selective, carefully placed testing. The approach seemed to gain reasonable acceptance among many practitioners. Over the years its use has spread considerably and the original book has since been translated into French, Portuguese, Danish, and two versions of Spanish.

The Changes in 1975

There were two principal changes made in 1975. One was the introduction of the concept of compliance verification. The other was a modification with respect to the application to computerized systems.

I will comment first on compliance verification. Although we felt that the logic of the cyclical supplementary tests was defensible, we decided to opt for annual compliance verification for three reasons. First of all, the general literature of the profession was moving solidly in this direction and we were beginning to feel a little lonely espousing the idea of very limited cyclical tests. Secondly, we found that in practice the supplementary tests were often badly executed by our staff. Perhaps because they were called supplementary, they were taken to be an after-thought which did not really need to be done well. In any case, we concluded that if more attention was not focused on compliance procedures it was unlikely that our staff would give the tests the attention they deserved.

Thirdly, the adoption of the substantive/compliance framework (which was first set out in the AICPA's Statement on Auditing Procedures No. 54) permitted us to resolve one of the dilemmas we had been facing for a number of years. During the early 1970's we had been working with a statistical sampling approach. We felt we knew a logical way to apply this statistical sampling to the year end audit work (statistical samples of accounts receivable, etc.) but we could not figure out a logical manner to apply it to the interim audit. We knew that statistical sampling should presumably be applied to our "supplementary tests" but we could not produce an obvious rationale for how one picked confidence and precision parameters without arriving at sample sizes which intuitively appeared unreasonably large (i.e., samples as large as would have been required for a substantive test had no reliance been placed on control). With the adoption of the compliance verification framework we were able to develop what we felt was a logical relationship between compliance testing and substantive testing based on the analogy of smoke detection versus fire detection.¹¹ While this latter point is perhaps not directly related to the basic idea of analytical auditing, it nonetheless was for us an outgrowth of this particular modification in our analytical auditing approach.

The other principal change in 1975 was the dividing of the computer-related review into two stages: a general computer environment review followed

by a specific application review for each particular computer system. The reason for this change was the realization that environment controls (pre-installation controls, organizational controls, development controls, operations controls, and documentation controls) tend to be common for all computer systems and can best be reviewed and evaluated at one time whereas processing controls (for example, input/output controls in a payroll system, programmed controls in a billing system) vary with each system and are best reviewed as an integral part of the evaluation of the individual system.¹²

Inevitably there have been many refinements in the organizing of the audit steps, the wording of the evaluation guides, and so on, but apart from the two modifications just mentioned, the changes have not been major in principle.

The Current Format of Analytical Auditing

In its present format, the analytical interim audit as we employ it is divided into six stages: 1) review of systems and preliminary compliance verification (including preparation or updating of flow charts and the walk-through of four or five transactions of each type), 2) evaluation of systems (based on an analysis of the flow charts with the help of internal control evaluation guides), 3) further compliance verification (depending on whether or not considerable reliance is to be placed on a given control area), 4) substantive (dual purpose) verification, 5) evaluation of compliance, and 6) issuance of an internal control/management letter.¹³

The emphasis on flow charting as an analytical tool is still present. The emphasis on auditing "through" the system is still present. At the same time, the analytical auditing approach has been fully integrated with sampling theory both as applied to substantive verification¹⁴ and as applied to compliance verification.¹⁵ This has led us to focus considerable attention on the nature of compliance verification objectives. We seek positive evidence that a key control has functioned; the mere absence of monetary error in the transaction examined does not constitute such evidence.¹⁶

Use and Evaluation within Clarkson, Gordon & Co.

We do not employ analytical auditing on all our interim audits. Where internal control is hopelessly weak throughout, where it is uneconomic to place any reliance on internal control, or where the enterprise is exceedingly small, it is often not efficient to employ analytical auditing techniques.¹⁷ However, we do employ analytical auditing in much more than half of our audit work in terms of hours. Some recent statistics indicate that slightly over 50% by number of our audits between 100 and 1,500 annual hours are done on an analytical auditing basis. Probably most of those under 100 hours would not be done as analytical audits while, on the other hand, virtually all of those over 1,500 hours are done as analytical audits. If the results were weighted by hours I would guess that more than 80% of our interim audit work is done on an analytical basis.

What have been the results? We have been generally pleased. We have found the advantages of analytical auditing to be the following:

1. It leads to a better understanding of the client's business and of the accounting system.
2. It leads to a more comprehensive appreciation of the system of internal control.
3. It helps to avoid the risk of perfunctory and unimaginative treatment that long procedural questionnaires and audit lists may invite.
4. It leads to many more valuable and more realistic recommendations on both internal control and systems efficiency.
5. It leads to greater use of initiative on the part of the audit staff in the field.
6. It leads to a more rational allocation of audit time over those areas of the accounts requiring attention.
7. It leads to greater productivity of audit time through the better briefing of audit staff.¹⁸

There are, however, some costs. There tends to be an investment in the first year when flow charts are being prepared for the first time (although when this work can be coordinated with internal audit the cost can be dramatically reduced). In any case, in later years there are compensating time reductions.

Secondly, like any sophisticated technique, it is open to abuse. If poorly trained or poorly directed, audit staff can waste time charting unnecessary detail. Until about a year ago, we felt we still had too frequent instances of what our quality control reviewers judged to be excessive flow charting. Our statistics indicate that such inefficiencies now occur on less than 7% of the engagements. Of course, there is still scope for improvement, but the problem is not of serious proportions.

In the early years we had a serious problem in getting staff to design the weakness investigations appropriately. This seems to have been less of a problem in recent years, perhaps because the quality control program kept hammering away at it.

Designing appropriate compliance procedures continues to be a problem in more engagements than we would like. This seems to us to be a problem in learning to apply the general concept of compliance verification itself rather than anything to do with the analytical auditing technique *per se*. The compliance framework is still relatively new. Our smoke/fire rationale requires that a compliance procedure look for positive evidence of the operation of the control (not merely evidence that the transaction itself was free of monetary error). This still seems to be a difficult viewpoint to get across.

Ironically, the analysis of statistics is one of the segments of the interim audit which we seem to do the worst. This procedure was referred to as "statistics analysis" in the original book.²⁰ The term has since been replaced with the current term, "analytical review."²¹ Whatever its name we do not do it as well as we would like. Whether a more formal use of regression analysis will prove to be the necessary discipline to improve the performance in this area remains to be seen.

Use by Others

Obviously, I can only talk with any certainty about the use of analytical

auditing within our own firm. However, from conversations with other colleagues I expect that the following summary is not too inaccurate. In Canada, there seems to be fairly widespread use of the comprehensive horizontal flow charting approach in Touche Ross, Peat Marwick, Thorne Riddell, Winspear Higgins, Arthur Andersen, and Ernst & Ernst. Often the flow charts are supplemented by detailed questionnaires. A number of smaller firms use the analytical auditing approach as well. As mentioned earlier, the Canadian Institute has been offering members courses in analytical auditing for the past decade. Coopers & Lybrand use a detailed questionnaire supplemented by comprehensive "vertical" flow charting (different mechanics but similar in principle). The internal audit departments of a number of major Canadian corporations employ analytical auditing in their work. At the government level, the Auditor General of Canada, with a staff of 400, and the Audit Services Bureau for Canada, with a staff of about 600, make extensive use of analytical auditing. The Provincial Auditors of three or four provinces make extensive use of analytical auditing while those of a couple of provinces (including Ontario and British Columbia) appear to make limited use of it. I do not want to suggest that all these users employ exactly the analytical auditing approach that we do. Some do. But many inevitably will have their own modifications and, no doubt, improvements. However, the general approach would appear to be reasonably common.

On the other hand, Price Waterhouse relies primarily on detailed internal control evaluation questionnaires, decision charts, and narrative systems descriptions and does not generally make use of a flow charting approach to systems analysis. Haskins and Sells relies on detailed questionnaires and extensive testing of transaction streams without generally making use of flow charting.

I am less familiar with the use of flow charting approaches in the United States. I do know that our associates in Arthur Young use the same walk-through audit approach as we do in the preliminary stage of gathering systems information and urge the use of basically the same horizontal flow charting technique as the preferred method for documenting the information obtained during this walk-through.

A Look to the Future

The use of analytical auditing in the future is likely to depend on the direction in which computer systems develop in the years to come. In one sense computerization may favor a systems-oriented approach such as analytical auditing, for the computer generally requires a more formal, rigid and reliable system. The auditor can place considerable reliance on this more rigid system if the new types of computer controls have been properly analyzed and evaluated. In another sense, computerization may favor the data-oriented approach, for computerized files may permit more extensive selection, analysis, comparison, and editing of data (especially with computer-assisted audit techniques) than possible before. Up to now we have felt that the circumstances in most computerized systems favor the systems-oriented approach. However, when computerized systems get extremely complex, the cost of comprehensive systems analysis may not be worth its payback. When a simple system generates quantities of data, it stands to reason that it is more efficient to check the system than the data. But

when the complexities of software housekeeping routines swamp the output of data, the pendulum may start to swing the other way. As we move into data base systems, the way in which data is handled may dramatically change the methods which auditors use. I don't think any of us really know how to audit data-base systems yet. Time is running out for us to learn. On the other hand, the explosive growth of mini computers and distributed processing may change the audit in other directions. I imagine that there will be a number of significant revolutions in audit approach as we feel our way into the next generation of computer systems. Whether the systems-oriented approach of analytical auditing will have a place in this brave new world it is premature to say. It will be interesting and challenging to find out.

Footnotes

1. A brief chronological bibliography of material on the subject is set out below.
 - a) Warren Chippendale, C.A. and Norman P. LeBlanc, C.A., "Progressive Audit Philosophy—The Practical Application," *The Canadian Institute of Chartered Accountants, Annual Conference Papers—1963*, pp. 51-78.
 - b) R. J. Anderson, C.A., "Analytical Auditing," *The Canadian Chartered Accountant*, November 1963.
 - c) Vernon Turley, C.A., "Flow Charting—A Modern Technique in Auditing," *The Canadian Chartered Accountant*, May 1964.
 - d) R. J. Anderson, C.A., "An Approach To Auditing Income Accounts," *The Canadian Institute of Chartered Accountants, Annual Conference Papers—1964*, pp. 186-194.
 - e) R. M. Skinner, F.C.A. and R. J. Anderson, F.C.A., *Analytical Auditing*, Sir Isaac Pitman (Canada) Ltd., Toronto, 1966.
 - f) R. J. Anderson, F.C.A., "Analytical Auditing—Does It Work?" *The Internal Auditor*, July/August, 1972, p. 36.
 - g) R. J. Anderson, F.C.A., "The Interrelationship of Compliance and Substantive Verification in Auditing," *Frontiers of Auditing Research* (Proceedings of the Symposium on Auditing Research, The University of Texas, April 1976), pp. 69-137.
 - h) R. J. Anderson, F.C.A., *The External Audit*, Pitman Publishing, Toronto, 1977—see particularly Volume 1 Chapter 9, "The Interim Audit," and Volume 2 Chapter 25, "Flow Charting to Document Systems Review," Chapter 26, "Analytical Interim Audit," and Chapter 27, "Analytical Interim Audit—Modifications for Computer Systems."
2. The interim audit objective which follows is related directly to the second field work standard in Canada. For a discussion of the differences between this and the U.S. second standard of field work see above Ref. h) Vol. 1, p. 88. The differences are probably consistent with subsequent interpretations of the earlier U.S. standard.
3. The systems-oriented and data-oriented strategies are discussed in Ref. h) Vol. 1, pp. 238 and 239.
4. Four different "review" techniques are: (i) gathering information simply from the tests of transactions, (ii) seeking answers to questionnaires, (iii) preparing or updating narrative systems notes, and (iv) preparing or updating flow charts (for a discussion of the comparative advantages of each or of some combinations see Ref. h) Vol. 1, pp. 216 to 222). Three different "evaluation" techniques are: (i) evaluation by studying the results of tests or narrative systems notes, (ii) evaluation by use of flow charts, (iii) evaluation by use of questionnaires or evaluation guides. (For a discussion of the comparative advantages of each or of some combination see Ref. h) Vol. 1, pp. 224 and 225.)
5. The term "analytical" in analytical auditing, referring to analysis of systems and controls, should not be confused with the term "analytical review procedures," which, during the intervening years has come to be used for the substantive review of business statistics, ratios, and other data for reasonableness and consistency.

6. Clarkson, Gordon & Co. is a Canadian firm of chartered accountants having presently some 200 partners and 2,000 professional staff (one of the largest public accounting firms in Canada though, of course, far from the size of the largest U.S. practices).

7. The two countries' practices are contrasted in Ref. h) Vol. 1, pp. 8 to 10.

8. See, for example, Ref. f) which was adapted from a debate staged at the 1971 Annual Conference of Accountants at The University of Tulsa.

9. While I am billed as the author of this text it was, in truth, a joint effort by John Davidson, countless other colleagues, and myself.

10. The advantages offered by the horizontal charting format are discussed in Ref. h) Vol. 2, p. 43.

11. The smoke/fire argument was first presented at the 1976 University of Texas Symposium (Ref. g) and is discussed in Ref. h) Vol. 1, p. 230.

12. See Ref. h) Vol. 2, Chapter 27, p. 116.

13. Each of these six stages is fully described in Ref. h) Vol. 2, Chapter 26, p. 82.

14. See Ref. h) Vol. 1, p. 354 and Vol. 2, p. 110.

15. See Ref. h) Vol. 1, p. 370 and Vol. 2, p. 108.

16. See the discussion in Ref. h) Vol. 2, pp. 104 to 107.

17. The criteria for choosing between analytical auditing and transactional auditing are discussed in Ref. h) Vol. 2, pp. 21 and 22.

18. For a discussion of these advantages see Ref. g) p. 44.

19. Some time statistics are analyzed in Ref. g) p. 52.

20. See Ref. e) pp. 78 and 79.

21. See Ref. h) pp. 111 and 112.