Expert System for Security Auditing (ESSAudit)

Nitaya Wongpinunwatana*
Department of Management Information Systems, Thammasat Business School,
Thammasat University

***Correspondence:** wongpinn5@gmail.com doi: xxxxx

Abstract

The objective of this study is to explain the development of an expert system which can guide new or inexperienced auditors through proper auditing procedures. This study, however, emphasizes on developing an expert system for auditing security transaction of security and finance company which is called "expert system for security auditing or ESSAuditor". The paper presents the analysis of the problem domain, the system design, and the ESSAudit system.

Keywords: Expert system, Security auditing, inexperienced auditors

ระบบผู้เชี่ยวชาญสำหรับการตรวจสอบหลักทรัพย์ (ESSAudit)

นิตยา วงศ์ภินันท์วัฒนา*

ภาควิชาระบบสารสนเทศเพื่อการจัดการ คณะพาณิชยศาสตร์และการบัญชี มหาวิทยาลัยธรรมศาสตร์

***Correspondence:** wongpinn5@gmail.com doi: xxxxx

บทคัดย่อ

วัตถุประสงค์ของบทความนี้เพื่ออธิบายการพัฒนาระบบผู้เชี่ยวชาญซึ่งเป็นระบบที่แนะนำผู้ตรวจสอบ ที่ไม่มีประสบการณ์เพื่อพัฒนาความรู้เกี่ยวกับขั้นตอนการตรวจสอบหลักทรัพย์ที่เหมาะสม โดยระบบที่นำเสนอในที่นี้เป็นระบบที่สอนการตรวจสอบหลักทรัพย์ที่ซื้อขายในตลาดหลักทรัพย์ ซึ่งในที่นี้จะเรียกว่า “ระบบผู้เชี่ยวชาญสำหรับการตรวจสอบหลักทรัพย์ หรือ ESSAuditor” บทความนี้นำเสนอปัญหาที่เป็นที่มาของการพัฒนาระบบ การออกแบบระบบ และระบบ ESSAudit

คำสำคัญ: ระบบผู้เชี่ยวชาญ การตรวจสอบหลักทรัพย์ ผู้ตรวจสอบที่ไม่มีประสบการณ์

1. Introduction

The Securities Exchange of Thailand (SET) has recently established one of the rules that all companies that want their stocks to be traded on the securities market must have internal auditors. These auditors have responsibilities to (i) investigate and recommend whether or not the company following the rules and regulations created by SET, (ii) identify suspicious area for further improvement on process control within the entire organization, and (iii) analyse whether the company demonstrates a satisfactory financial performance and sound control practice. Thailand, however, still lacks experience auditors to cope with the SET's requirements. One way to alleviate this problem is to train new graduates from universities by using method of on the job training. Though this method can solve the problem of insufficient staffs, on the job training also has its problems. The novice auditors do not have a complete guideline to determine the effectiveness of internal control. When these auditors confront with the activities which are loose of control, they cannot make judgement. As a result, they always do their auditing by using common sense and sometimes they bypass or neglect the vulnerable areas (Harnois, 1991; Konrath, 1993). For example, if a young auditor finds that the company does not record the allowance for bad debt, he/she always stops auditing and starts to write recommendation. In fact, the auditor should find other related evidences. Moreover, young auditors normally find difficulty in understanding working reports from previous auditors because of no standards in this regard. As a result, they cannot identify the exact causes of control and weakness activities from the reports.

One of the effective tools that a company can use is to develop an expert system. This system can replicate the expertise of experienced auditors. In addition, the system can use to remind young auditors by providing procedures and standards that are necessary to carry out a quality auditing. The purpose of this study is to develop an expert system which can guide new or inexperienced auditors through proper auditing procedures. This study, however, emphasizes on developing an expert system for auditing security transaction of security and finance company. This system is called an expert system for security auditing (ESSAudit).

The remainder of this paper proceeds as follows. The first section presents the analysis of the problem domain. The second section explains the system design. The third section presents the ESSAudit. The last section provide coclusions.

2. Analysis of the problem domain

The first step in determining what should be included in the development of an auditing assistance expert system is to determine what are the vulnerable areas which might be exposed to fraud or what are the ambiguous situations whose implications can not be fully understood by a young auditor. The identification of the control points of these areas will form the problem domain of this system. An extensive and detailed analysis of the auditing procedures was carried out using flow charts which depict the flow of information through various departments of one security and finance company. Along the analysis process, opinions and consultations were sought from experienced auditors of the Faculty of Commerce and Accountancy, Thammasat University, as well as the top management of the company (Radeesri et. al., 1992). A total of 55 internal controls were concluded. Each control incorporates of (i) the objective, (ii) the possible weakness that might occur, (iii) the possible error that can occur as a result of the weakness, and (iv) the proper auditing procedures. The 55 internal controls span across seven operation functions : *Open Account, Buy and Sell Order, Receipt from Customer, Check Return, Payment*

to Customer, *Promissory Note Redemption*, and *Close Account*. These seven operation functions are currently carried out by the three management departments as shown in the organization chart in Figure 1.

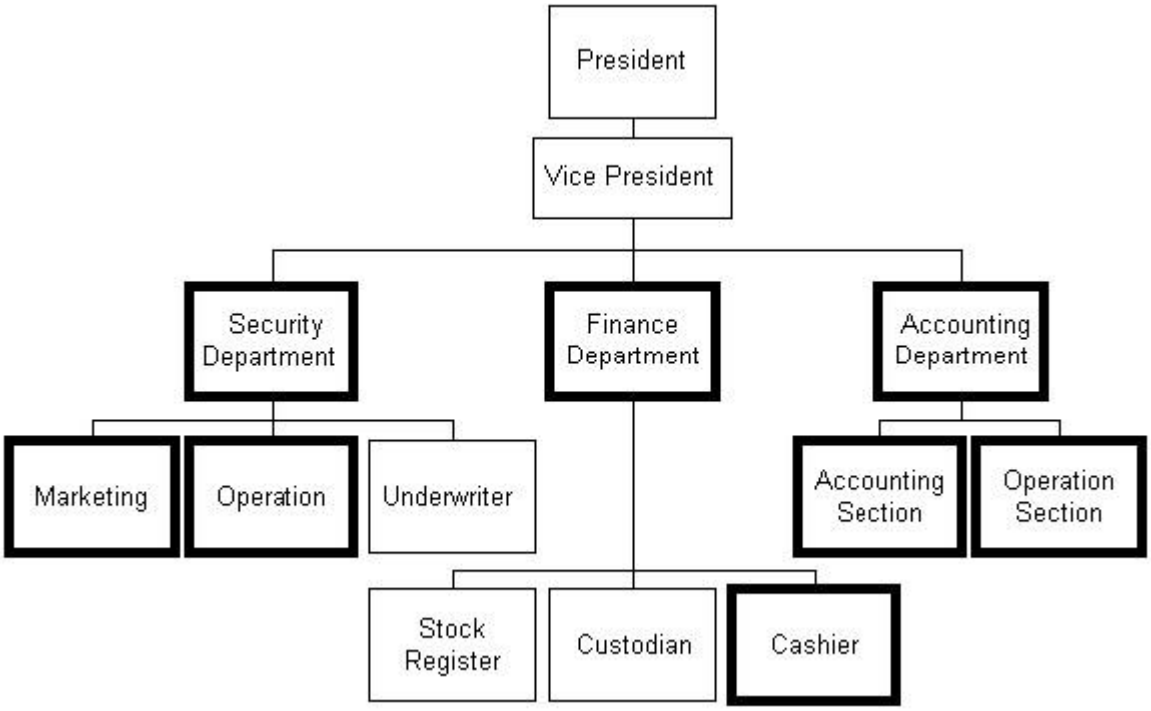

Figure 1 Organization chart for all concerned departments with security operations

3. System design

The main objective of this system is to provide a complete reference for auditing securities consultant for novice auditors under the areas of *Open Account*, *Buy and Sell Order*, *Receipt from Customer*, *Check Return*, *Payment to Customer*, *P/N Redemption*, and *Close Account*. Therefore, the system should consist of four main modules. These modules are for (i) updating the audit database, (ii) self-educating the security auditing, (iii) assisting auditors during auditing field, and (iv) producing the auditing summary of composite rating. Figure 2 indicated system's components.

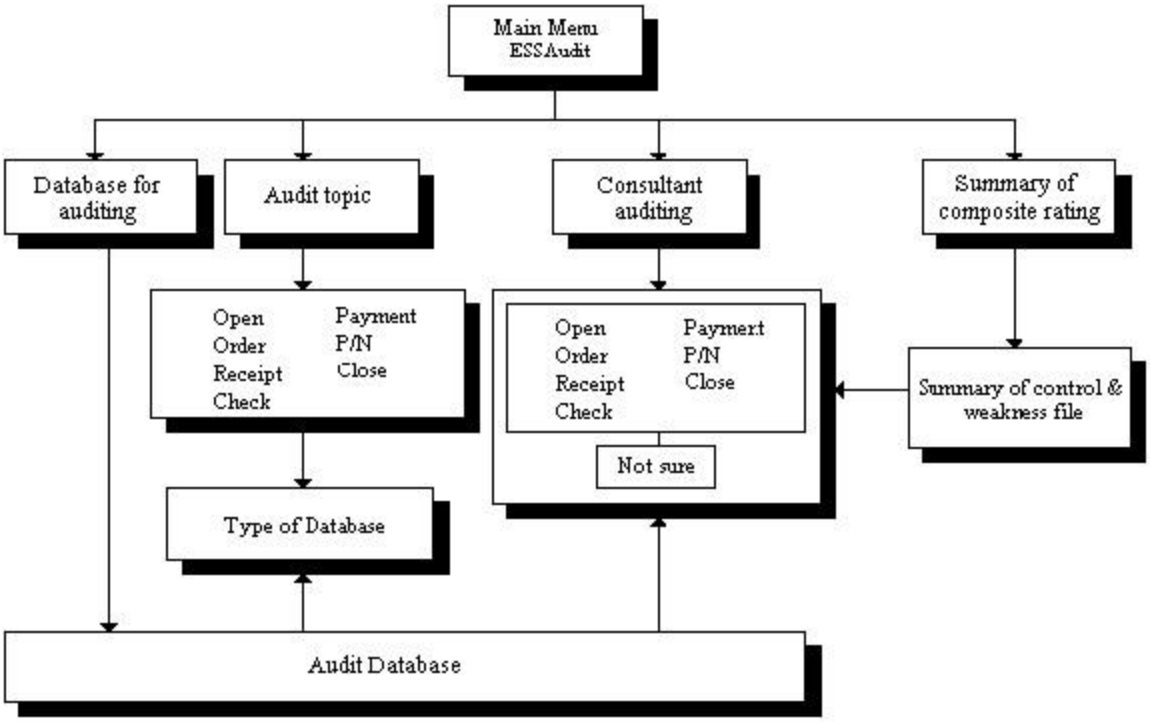

Figure 2 ESSAudit system's components

From the above figure, the ESSAudit system incorporates of twenty knowledge bases and two database files. The explanation of each knoledge base is as follow.

First, an ESSAudit knowledge base is a main menu to other knowledge bases in an expert system for security auditing.

Second, database for auditing is to show all data in the audit database file. Auditors can view data about audit number, description, objective, weakness, possible error, and audit procedures. In addition, the auditors can adjust or update all field in audit database such as description, objective, weakness, possible error, and audit procedures to make these information suitable to each security and finance company.

Third, audit topic is a menu for entering into other training knowledge bases. The training knowledge bases allow auditors to view audit topics for each audit area. The audit topics consist of *Open Account*, *Buy and Sell Order*, *Receipt from Customer*, *Check Return*, *Payment to Customer*, *Promissory Note (P/N) Redemption*, and *Close Account*. This application lists audit topics for a selected audit area. In addition, auditors can view the details of audit procedures for the specific topic. Furthermore, the system is designed to separate database into two database files to avoid data redundancy. For example, bank reconciliation for *payment to customer* and *P/N redemption* knowledge base use the same audit procedures. The database files consist of the type of database and the audit database. The type of database is to keep audit number and audit type. Meanwhile the audit database is for audit number, description, objective, weakness, possible, and audit procedures.

Fourth, consultant auditing is a menu for entering into other consultant knowledge bases. The consultant knowledge bases includes audit areas in the field of *Open Account*, *Buy and Sell Order*, *Receipt from Customer*, *Check Return*, *Payment to Customer*, *Promissory Note (P/N)*

Redemption, and *Close Account*. The procedures of each consultant audit area are described in figure 3.

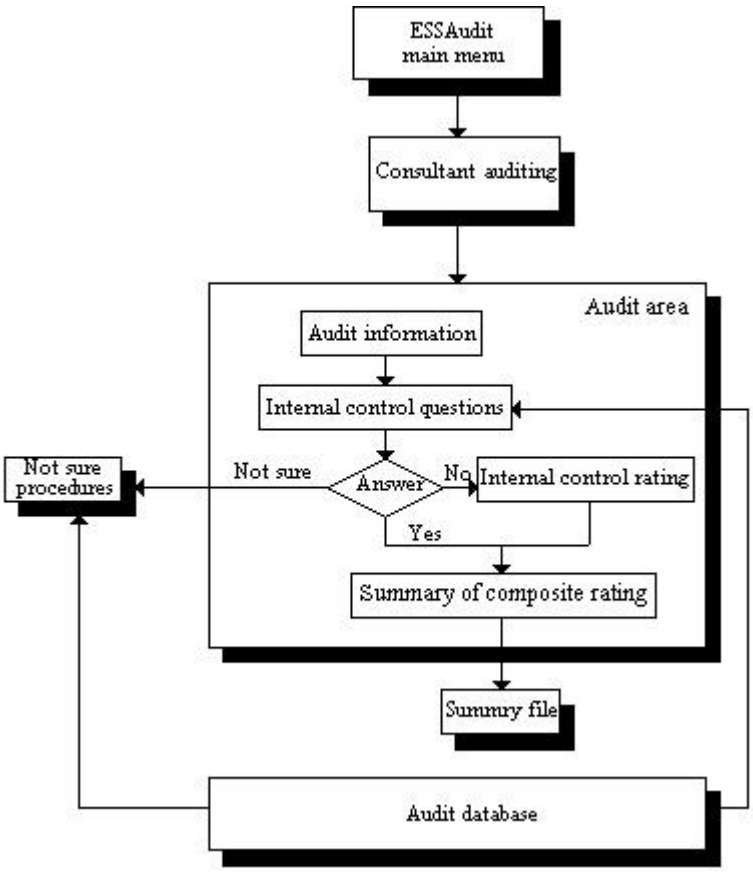

Figure 3 Procedures of each consultant audit area

The auditors have to fill in audit information such as client's name, period, and auditors' name. They then have to answer internal control questions by selecting one of the three answer choices: *"Yes"* (have control), *"No"* (loss control or do not have control), and *"Not Sure"* (control is uncertain). For *"No"*, the auditors need to enter the number of loss control transactions and the number of total transactions that they use as a sample to examine internal control. These numbers are used to calculate percentage of loss control which in turn used to calculate a rating. All rating of each loss control (answer for internal control question = 'No') within the same group[1] are averaged as a *factor rating*. In the meanwhile, the factor ratings of each group will be averaged as a *composite rating*. The application shows the summary of composite rating at the end of consultation. The factor rating is calculated by (i) calculate percentage of loss control[2], (ii) transform percentage of loss control to rating by using benchmark from table 1, and (iii) average rating of each loss control to factor rating.

[1] The associated internal control questions are grouped into data, document, and person when the questions examine control for data, document, and person respectively.

[2] Percentage of loss control = $\frac{\text{(Number of loss control transaction * 100)}}{\text{Number of total transactions}}$

Table 1: Rating table

No. of percentage of loss control	Rating	Remarks
0 to <= 10	5	Rating 5 = Good
> 10 to <= 20	4	Rating 4 = Almost Good
> 20 to <= 30	3	Rating 3 = Fair
> 30 to <= 40	2	Rating 2 = Almost Fair
> 40	1	Rating 1 = Poor

The example of factor rating for data is shown in table 2.

Table 2: An example of factor rating for data

Internal Control Questions	Answer	Number of loss control transactions	Number of total transactions	% of loss control	Ratings
Customer's identification is recorded in computer correctly.	Yes	-	-	-	5
Customer's credit limit is recorded in computer correctly.	No	30	100	30	3
Supervisor checks accuracy of credit limit in computer.	No	5	70	7	5
Factor rating for data					**4.33**

For *"Not sure"*, the auditor need to carry out the audit procedures to determine the reliability of the control for the internal control question. A knolwedge base called *"Not sure procedure"* is developed to display audit procedures. This knowledge base retrieves audit procedures from audit database by using audit number.

Finally, summary of composite rating knowledge base is to print a report from a summary of control and weakness file. This file is created when auditors use the consultant knowledge base of each audit category. The auditors can keep this summary of rating report as a working paper or as an auditing report. In addition, they can rearrange and adjust the report for their suitable need.

4. ESSAudit

The nature of grouping audit areas and audit procedures has led to the conclusion that the object oriented design was more appropriate for the development of this system. The Level5-Object expert system shell had been used to develop ESSAudit system (Information Builder, 1991a, 1991b). The interface screens of the system are discussed below.

4.1 ESSAudit main menu

The system starts from ESSAudit main menu as shown in figure 4. The ESSAudit main menu has four options. These options tell the application which functions auditors want to work with. The functions can be "Database for auditing", "Audit topics", "Consultant auditing", and "Summary of composite rating".

Figure 4 ESSAudit main menu

4.2 Database for auditing

When the auditor selects “Database for auditing” and enter record number on to the application. The database for auditing screen appears (Figure 5). The auditor can change data in this record and save into the audit database.

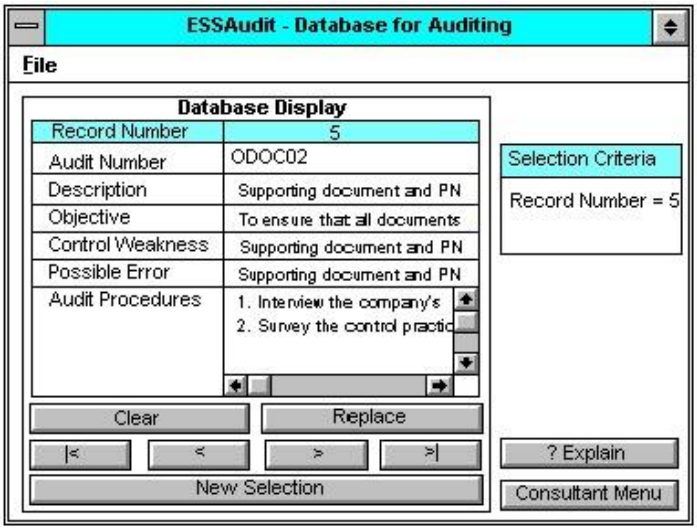

Figure 5 Database for Auditing - Database Display

4.3 Audit topics

When the auditor selects "Audit Topics" from Figure 4, the following window appears.

Figure 6 Audit Topics Menu

From this window, it shows a list of audit areas. If the auditor selects one of the audit areas, such as Open Account, the application will show the selected audit topics related to that audit area as shown in Figure 7.

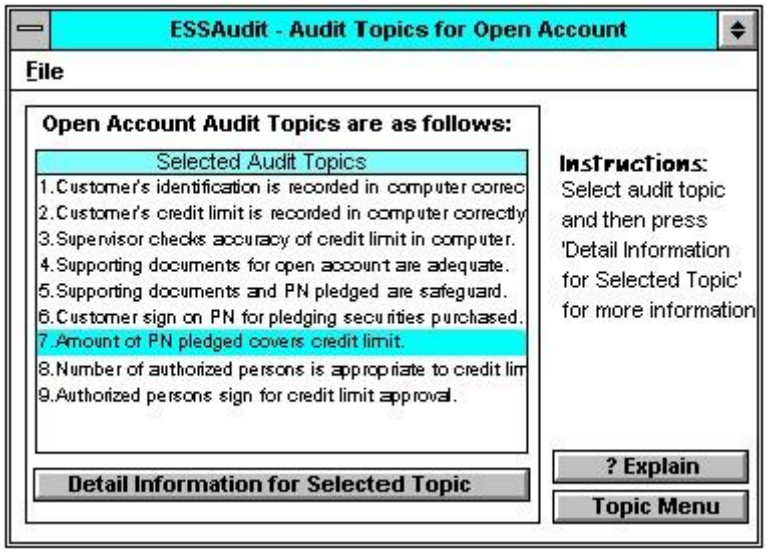

Figure 7 Audit topics for open account

An auditor can get more information (audit number, objective, control weakness possible error, and audit procedures) for one of the selected audit topics by selecting a topic. The information for selected topic is shown in Figure 8.

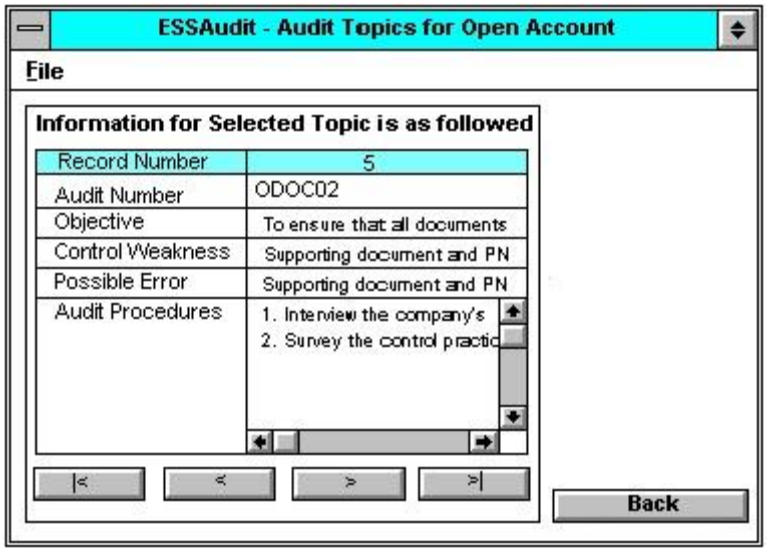

Figure 8 Information for selected topic

4.4 Consultant auditing

When an auditor selects "Consultant Auditing" from figure 4, the following window appears.

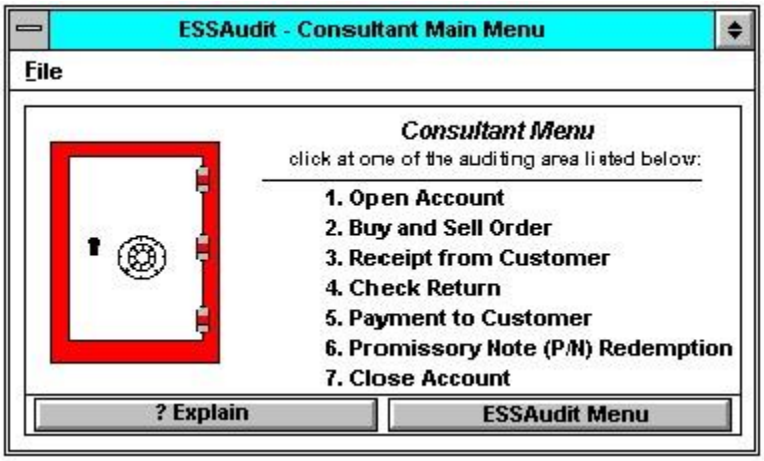

Figure 9 Consultant Main Menu

From this window, it shows a list of consultant audit areas. When an auditor selects one of the consultants, such as Open Account, the application will show the series of auditing questions as shown in Figure 10.

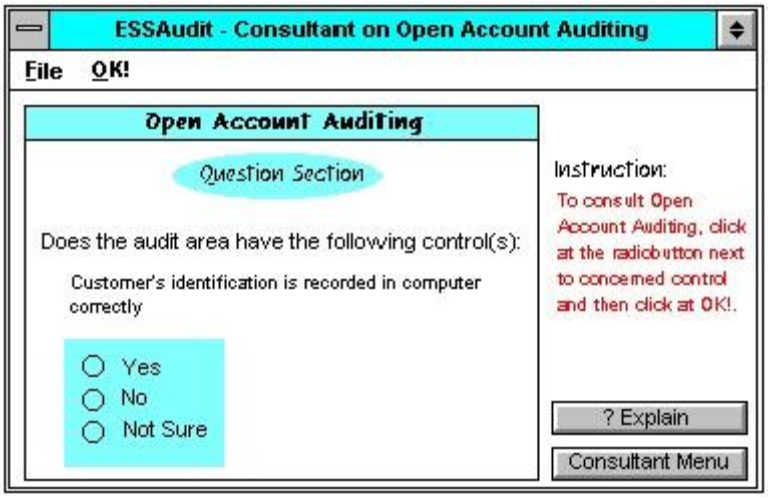

Figure 10 Consultant on open account auditing - Question section

From the window, an auditor should answer the internal control questions related to a selected consultant auditing. The answer for internal control might be "**Yes**", "**No**", or "**Not Sure**". If the answer is "**No**", the *Consultant on Open Account Auditing - Rating Section* window appears as shown in Figure 11.

Figure 11 Consultant on open account auditing - Rating section

An auditor has to enter the number of loss control transactions and the number of total transactions. After the auditor finishes answering the internal control questions, the application will show the summary of composite rating as follows.

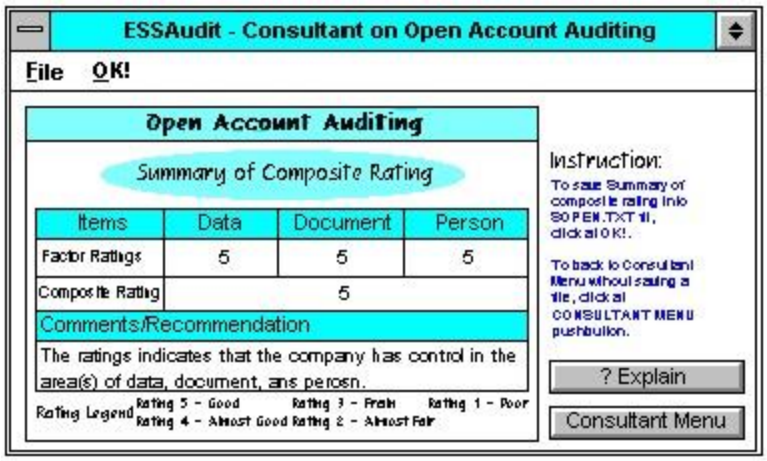

Figure 12 Consultant on open account auditing - Summary of composite rating

The application will save a a summary of rating into a summary of control and weakness file for later printing. If the answer is "**Not Sure**", the application will show audit procedures for auditing that internal control question as shown in Figure 13.

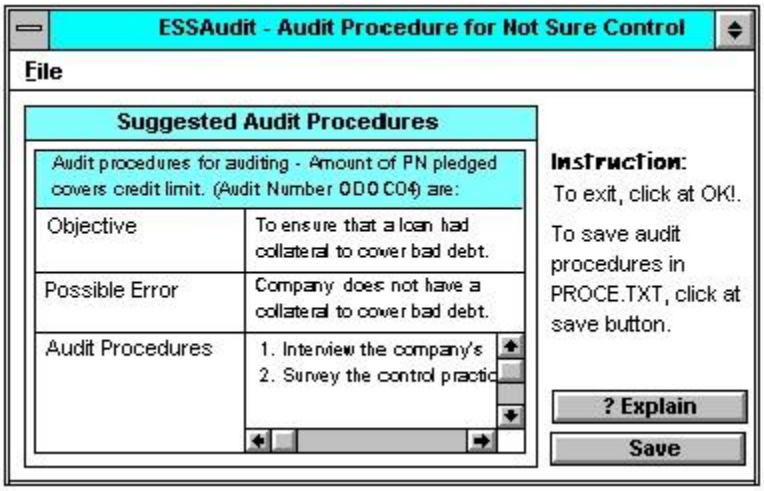

Figure 13 Audit procedure for Not Sure control - Suggested audit procedures

4.5 Summary of composite rating

When an auditor selects "Summary of Composite Rating" from figure 4, the following window appears.

Figure 14 Summary of composite rating menu

From this window, it shows a list of audit areas. If an auditor selects one of the audit areas, such as Close Account, the summary of control and weakness file (SCLOSE.TXT) is opened. The auditor can rearrange, adjust, and print information from this file by using the function provided by Write program.

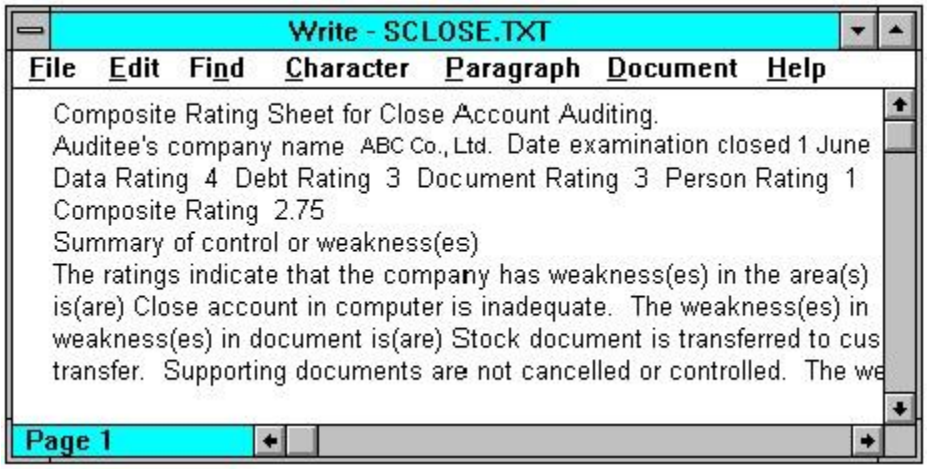

Figure 15 Write - SCLOSE.TXT

5. Conclusions

This paper has described the developing process of an ESSAudit expert system. This system can be useful to both educators and practitioners. The system can be used as a device to present complex security auditing problem to students. In addition, the system can be used by practitioners in training inexperienced staffs.

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