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THE DEVELOPMENT OF A COMPUTER AUDITING SYSTEM SUFFICIENT FOR SARBANES-OXLEY SECTION 404 - A STUDY ON THE PURCHASING AND EXPENDITURE CYCLE OF THE ERP SYSTEM

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Abstract

After Section 404 of the Sarbanes-Oxley Act was released, developing an effective computer auditing system became critical for management and auditors. In this study, the researchers used Gowin's Vee, raised as a research strategy by Novak and Gowin (1984). On the theoretical side, the researchers arranged documents and employed an expert questionnaire to identify 8 operational procedure elements and 34 critical factors for the purchasing and expenditure cycle. The application side was built upon the model. The researchers then developed the computer auditing system based on the developments of this study. To test the suitability of the system, the researchers conducted a case study whose results showed that this system can provide the company owners and their accountants with a simple, continuous, timely, and analytical method which may help them detect promptly any irregular internal control issues, thus identifying measures to improve the condition.

Key Words: Computer Auditing, Internal Control, Purchasing and Expenditure, Sarbanes-Oxley Act

1 INTRODUCTION

The Enron scandal in 2001 has had a great impact on many investors' confidence. Pressured by investors and criticism, the United States Congress hastily passed the Sarbanes-Oxley Act (SOX) of 2002 into law. The most contentious aspect of SOX is Section 404 (SOX 404), which requires management and external auditors to report on the adequacy of the company's Internal Control over Financial Reporting (ICOFR). This is noted by companies as the most costly aspect of the legislation to implement since documenting and testing important financial manual and automated controls requires enormous effort (Chan et al. 2005).

However, the validation and correctness of the internal control has remained an issue to management units and accountants since their key responsibilities revolve around fulfilling implementation and auditing of internal control. While many firms have resorted to computerization of their operations, auditing remains a manual task for some organizations. Similarly, firms that have adopted computer auditing techniques have not yet fully attained effectiveness and efficiency. As such, the need for a useful computer auditing system becomes critical because manual audits cannot immediately recognize significant discrepancies unlike in computers. It is in this light wherein a simple, continuous, timely, and analytical computer-support auditing system and the SOX compliance becomes necessary for auditing personnel (Goldsmith 1999, Information System Audit and Control Association (ISACA) 2003, Huang and Chuang 2005, Yen et al. 2006).

When the Enterprise Resource Planning (ERP) system was introduced, firms begun to handle information more precisely and accurately, and thus changed and improved the quality of accounting and financial processes. Manual operation in firms has been gradually phased out by the computer system. One factor may be that under manual practice, data are distributed to various files and books, which make internal control difficult and complicated. In response to this, Yen et al. (2006) and Coppers and Lybran (2002) pointed out that auditing personnel must properly deal with the change caused by the ERP system.

Although many auditing software generated by the ERP system is considered reliable, auditing personnel find difficulty in using the system because of their insufficient knowledge concerning information technology. Apart from the lack of knowledge and unfamiliarity with the software, the ERP systems themselves are complex enough for their application (Tsai and Feng 2004, Lanza 2005). Most firms deal with business processes through semi-manual methods, like the use of Microsoft Excel (Huang and Chuang 2005). Therefore, an easy-to-use computer auditing system developed exclusively for a certain ERP system is deemed expected and needed. It is on this concern that this research was anchored. Specifically, this research aims to achieve the following purposes: (1) to explore the crucial control items of the purchasing and expenditure cycle in meeting the conditions of SOX 404; (2) to develop a computer auditing system based on the recognized control items and requirements of SOX 404; and (3) to validate the applicability of the system using an ISO/IEC 9126 model in meeting organizational needs.

2 THEORETICAL BACKGROUND AND DISCUSSION

2.1 SOX 404 and Purchasing and Expenditure Cycle

SOX 404 includes three main provisions: (1) management units must construct, implement, and maintain effective Internal Control over Financial Reporting (ICOFR); (2) management units must propose the assessment report on the effectiveness of ICOFR; and (3) firms must hire accountants who will propose the assessment report on the effectiveness of ICOFR and who will also report this to firms.

Considering the peculiar characteristics of industries, the researchers found that the purchasing and expenditure cycle is the more consistent internal control system cycle. It was further found that firms can further create additional value by acquiring the product and labor for reasonable prices. Li and Lin (2004) support the claim that purchasing and expenditure is one key cycle affecting corporate performance. Therefore, this study treats the purchasing and expenditure cycle as an important example for a computing-auditing system development. Ma (2006), Romney and Steinbart (2006) and Wu (2007) have similar definition on the purchasing and expenditure cycle and its view of control items (see Table 1).

Scholars Procedure	A	B	C	D	E	F	G	H	I	J	K	Times
Procurement request	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	10
Procurement	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	11
Checking and storage	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	11
Payment request	✓		✓			✓	✓		✓			5
Return and compensation bill dealing	✓			✓								2
Audit payment	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	11
Payment	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	11
Posting (general ledger)				✓	✓	✓	✓			✓	✓	6

Source: A: Wu, 2007; B: Ma, 2006; C: Romney and Steinbart, 2006; D: Chen and Ke, 2005; E: Hall, 2004; F: Wilkinson et al., 2000; G: Gelinas et al., 1999; H: Boockholdt, 1999; I: Robertson and Louwers, 1999; J: Bodnar and Hopwood, 1998; K: Wilkinson and Cerullo, 1997.
Times: total times of the items

Table 1: Reorganization of the Procedure of the Purchasing and Expenditure Cycle

2.2 Computer Auditing and Generalized Audit Software

ISACA (2003) suggested that auditing personnel should have complete access to computer-assisted auditing techniques (CAATs) and the application which includes using the generalized auditing software and advanced techniques, such as testing data producer and integrating test facilities. However, the use of generalized audit software may not be advantageous to everyone in the auditing department of a company. For one reason, not everyone has ample knowledge of the technology they should use. In addition, Huang and Chuang (2005) suggested that auditing personnel may be able to handle the operational principle of generalized audit software used in a small-scale system, wherein auditing personnel deal with less data forms, but not in the ERP system because of the bulk of data forms. With such complicated database framework, auditing personnel without professional information background to manage computer auditing may find the work certainly difficult. In relation to this problem, this research also derived on scholars' views on the disadvantages of generalized audit software (as reorganized in Table 2).

Scholars and experts	A	B	C
Disadvantages of generalized audit software			
1. Because of the complexity of information techniques and systems, auditing personnel cannot totally probe into the aspects of editing, such as different auditing environments, including different models, business system, program language, record and file arrangement, and the like.	✓	✓	✓
2. Because they lack professional information, the personnel rely on experts, who may be advised to explain in writing how they accomplish specific audits which are out of the work scope of auditing personnel.	✓	✓	✓
3. Auditing personnel do not participate in information system development.	✓		
4. Supervisors who make decisions do not value the importance of a computer-aided auditing system.	✓		
5. The background and experience of auditing personnel and the lack of related certificates will also influence the confidence in auditing.	✓		✓
6. Educational training cannot be carried out	✓		
7. Costs for developing generalized audit software are high, not to mention, the long time consumed to acquire auditing data.		✓	✓

Source: A. Huang (2006); B. Tsai and Feng (2004); C. Lanza (2005)

Table 2: Description of the Disadvantages of Generalized Audit Software

2.3 Control Factors of the Purchasing and Expenditure Cycle

Both local and foreign studies (Li and Lin, 2004; Chan et al., 2005; Li and Chou, 2006; Ma et al., 2006; Wu, 2007) showed that fraud in firm auditing systems exist. Nevertheless, the provisions stipulated in SOX 404 will help find the firms with unsatisfactory financial statements and demonstrate the necessity and effectiveness of implementing an internal control system in firms.

Based on various materials produced by local and foreign scholars and accountants, the researchers of this study reorganized the control factors as shown in Table 3. Computer auditing items means items to be tested for auditing objectives (eg. Completeness or accuracy) via computer. The last two auditing points (“balance of PPV item listed in the auditing personnel system” and “balance of IPV item listed in the auditing personnel system”) are not cited in the publications of experts and scholars. However, to meet the needs of a business circle, this research included these auditing points and examined their validity using expert questionnaires.

3 RESEARCH METHOD AND DESIGN

The study employs Gowin’s Vee as its research strategy. Gowin’s Vee is a diagram to assist knowledge construction and attainment. Beginning its conception, it has been applied in many fields and helped researchers to clarify their concepts. The diagram includes two domains to develop its “V” shape. One part is the conceptual side that guides researcher on “how to think,” and the other is the methodology side that guides researcher on “how to do.” During the initial stage, researchers would define the type of phenomena or research question they want to observe, and they can follow necessary steps from each domain to accomplish the theoretical development. Via the interaction of the two domains, researchers can attain knowledge and solve the question using this mapping (Novak and Gowin, 1984). The goal of this research is to develop a computer auditing system. In the conceptual side, this study reorganized the auditing control items complied with SOX 404 in the purchasing and expenditure cycle, which were collected from literature and revised by expert questionnaire. For the methodology side, we developed the system and implemented two case studies to validate the system. The design of this research process is shown in Figure 1.

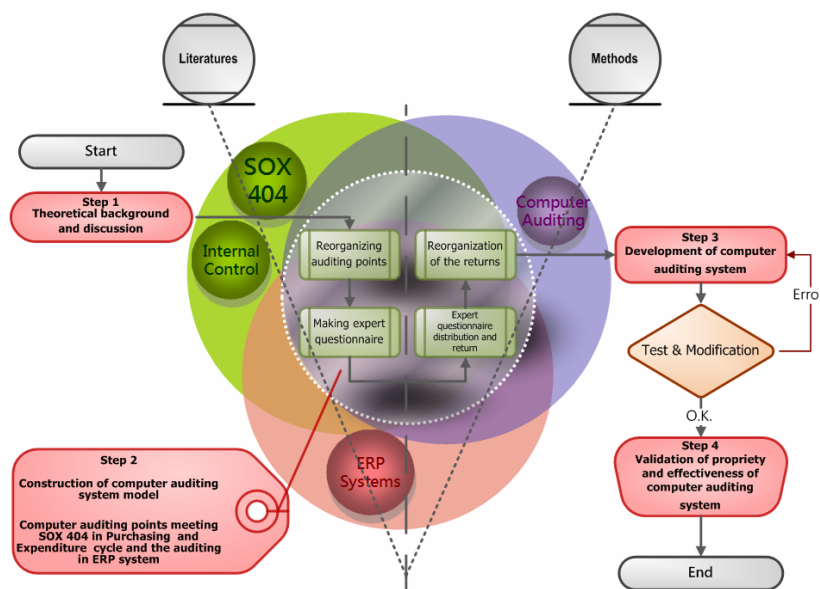


Figure 1: Research Framework and Flow Chart

Content	Auditing points	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	
Purchase Requests	1. Is the procurement request approved by proper levels?	✓	✓	✓	✓			✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	
	2. Are economic procurement quantity and re-purchase locations marked for each category of products?	✓	✓	✓	✓	✓		✓					✓	✓						
	3. Is procurement request repetitive?						✓												✓	
	4. Is the distribution of procurement request to avoid authorization practiced?						✓												✓	
	1. Is there ordering from unqualified suppliers?		✓		✓	✓	✓	✓			✓		✓		✓	✓			✓	
	2. Is the procurement request approved by proper levels?	✓		✓	✓			✓			✓	✓	✓	✓		✓	✓	✓	✓	
	3. Are there new suppliers during the period?	✓				✓													✓	
	4. Is the date of expected goods stock earlier than actual date on the procurement form?						✓						✓							
	5. Does not receiving the goods after the expected delivery date happen?				✓		✓		✓	✓			✓		✓					
	6. Is the unit price of urgent procurement reasonable?						✓													
Purchasing	7. Is the pricing of units with more procurement and purchase materials reasonable?		✓		✓	✓	✓	✓			✓	✓		✓		✓	✓			
	8. Are there unwanted products or excess procurement?	✓	✓		✓	✓	✓	✓	✓	✓							✓	✓		
	9. Do suppliers cancel order repetitively or is unit price changing frequently?					✓	✓													
	10. Do giving of fake suppliers and forging of quotation of prices happen to avoid procurement regulation?	✓					✓												✓	
	11. Do some personnel favor certain suppliers to clarify some specifications to control the prices?						✓													
	Receive and Store Goods	1. Is there receiving of the goods without procurement forms?		✓	✓				✓	✓	✓	✓	✓		✓	✓	✓	✓		✓
		2. Is the quantity correct—not more or less than the specified quantity?	✓	✓		✓	✓	✓				✓			✓	✓				
		3. Are the quantities for delivery, receiving, and checking different?	✓	✓		✓	✓	✓				✓	✓			✓	✓			✓
		4. Is checking for unqualified materials done?		✓	✓		✓	✓								✓				
		5. Is error checking of goods stock quantity done?	✓		✓			✓								✓		✓		
6. Does goods stock meet regulations?					✓		✓													
Suppliers' Request	1. Are there errors in the invoices of suppliers' goods stock?		✓				✓	✓	✓	✓	✓				✓	✓				
	2. Are the names of brands and quantity of goods stock invoice and checking file different?			✓	✓		✓		✓	✓	✓	✓	✓				✓	✓	✓	
Purchase Discounts	1. Are returned goods paid for?						✓		✓	✓		✓								
	1. Is the account year of accounts payable analyzed?	✓					✓													
	2. Is the checking date later than account payable date?			✓			✓								✓					
Payment	3. Is the supplier account with the debtor's balance?	✓			✓	✓	✓	✓				✓	✓		✓			✓		
	1. Is payment of certain items repetitive?	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓					✓		✓	
	2. Is there payment even without orders, checking forms, or materials?		✓		✓	✓	✓	✓	✓	✓	✓	✓			✓	✓				
	3. Is there any error in the calculation of payment?	✓			✓	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓	✓	
	4. Is there loan without reducing deposit?						✓	✓									✓		✓	
	5. Is payment for specific suppliers early?					✓	✓													
	6. Is there payment for fake suppliers?		✓			✓	✓			✓					✓					
	1. Are accounts payable and balance of general ledger compared?		✓		✓	✓					✓	✓		✓		✓	✓	✓	✓	
	2. Are the top ten transaction amounts and suppliers listed in order by computers?						✓													
	General ledger and test of analytical validation	3. Should the auditing personnel system list turnover rate of accounts payable?			✓	✓														
4. Should the auditing personnel system list payment days of accounts payable?					✓															
5. Should the auditing personnel system list credit level?					✓															
6. Should the auditing personnel system list accounts payable in total capital?				✓	✓															
7. Should the auditing personnel system include current ratio?				✓	✓															
8. Should the auditing personnel system include acid ratio?					✓															
9. Is the balance of PPV item listed in the auditing personnel system?																				
10. Is the balance of IPV item listed in the auditing personnel system?																				

Source: A: Wu, 2007, B: Chen and Ke, 2005, C: Tsai and Feng, 2004, D: Li and Lin, 2004, E: Su, 2003, F: Wu and Hong, 2006, G: Romney and Steinbart, 2006, H: Wilkinson et al., 2000, I: Wilkinson and Cerullo, 1997, J: Boockholdt, 1999, K: Robertson and Louwer, 1999, L: Boynton et al., 2001, M: Yen, 2002, N: Lin, 2002, O: Messier, 2000, P: Romney and Steinbart, 2000, Q: Arens et al., 2005, R: Guy et al., 1999, Total: Total number of the items

Table 3: Reorganization of the Control Factors of the Purchasing and Expenditure Cycle

4 INITIATION OF THE ERP AUDITING SYSTEM

The researchers examined the different measurement constructs and indices to arrive at computer auditing items suitable for the purchasing and expenditure cycle; moreover, the researchers carried out further study on the subject. With the combination of theory and practice, the researchers anticipated that the validity, scope, and practicability of this research would increase. A total of 18 valid expert questionnaires were returned (18 experts contain 6 scholars, 6 CPA, and 6 auditing personnel).

According to the validation methods proposed by Lawshe (1975), Content Validity Ratio (CVR) should be at least 0.43. After the statistical analysis of the responses yielded by the expert questionnaire was completed, the researchers performed the following steps:

- Computer auditing items which did not suit the development of the auditing system and did not meet the requirements set by SOX 404 were omitted.
- Items which did not suit the development of the system were omitted.
- Items which did not suit the development of the system but could influence the regulations of SOX 404 according to the experts' opinions were retained.
- Items which could not influence SOX 404 but would be suitable for system development according to the experts' opinions were retained.

Finally, the researchers arrived at eight procedure constructs and 34 control items as shown Figure 2.

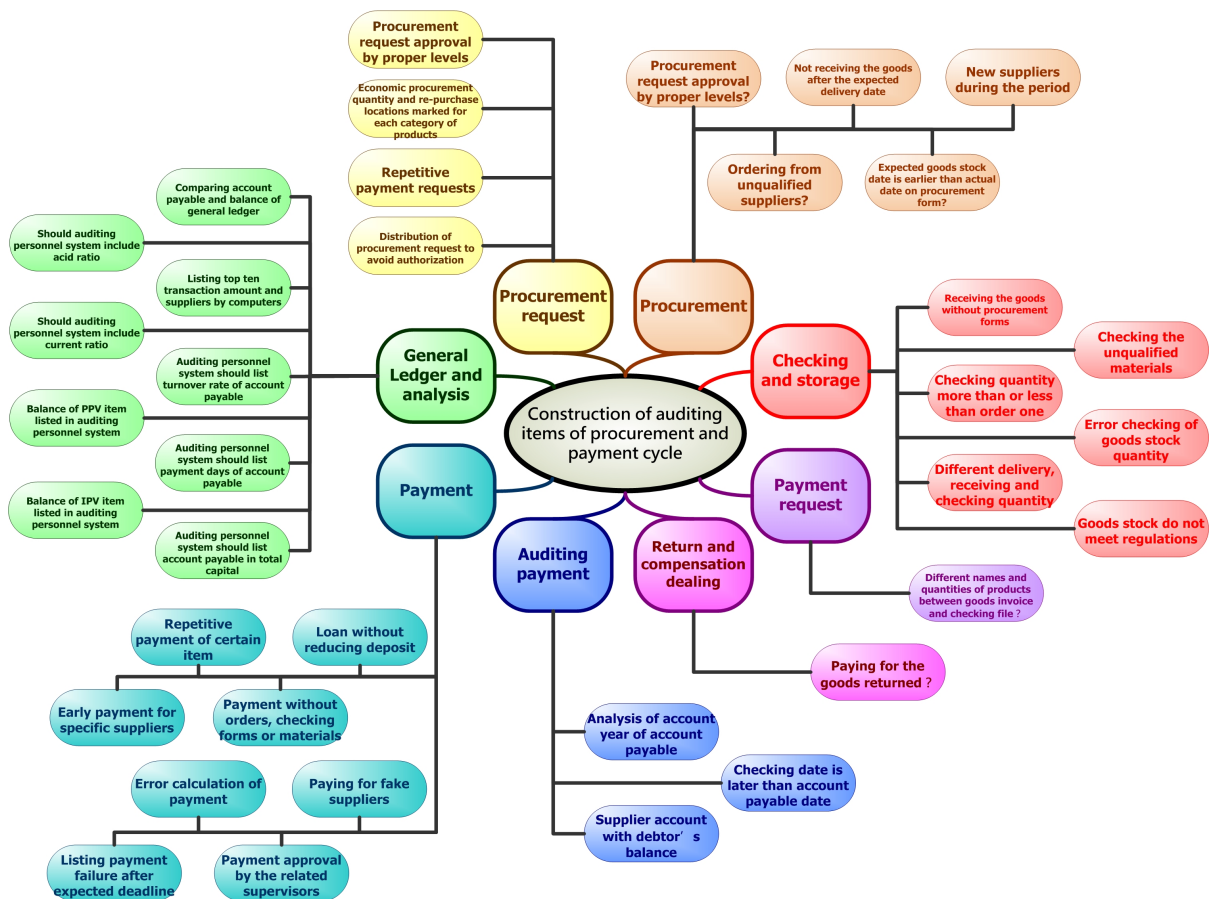


Figure 2: Construction of Auditing Points of the Modified Purchasing and Expenditure Cycle

5 DEVELOPMENT OF THE ERP AUDITING SYSTEM

The first phase of SDLC (Systems Development Life Cycle) is system planning and selection. This phase intends to analyze the present environment, probe into the background of the problems, inquire on users' principal needs and ideas, and target on their demands and proposals. The auditing system proposed in this study should not only improve the disadvantages of the generalized audit software, but also consider the use of prevalence and propriety of the system. Based on this idea, the researchers described the system and framework adopted by this research as follows:

- This auditing system must be developed using Microsoft Windows 2000 or Windows XP operating system.
- This research used Microsoft Visual Studio 2005 as the development tool and Visual Basic as main system development language. It also treated SQL as the second auditing program language of auditing items. (The program language for developing auditing system will not influence the auditing personnel's operation of this auditing system)

The second phase of SDLC is system analysis. The system analysis personnel must thoroughly learn all the processes of the organization and the information system applied at work. The analysis includes several sub-stages. Based on this, this research compared the process according to the definitions proposed by Valacich et al. (2001) to probe into the completed phases of system analysis in this research (see Table 4).

Phases	Definition or items included	Step description of this research or output	Phase	Definition or items included	Step description of this research or output
Phase 1	It targets on the requirement of the system. The phase includes the complete study of any present systems, manuals, and computer aspects. Certain parts can be replaced or increased.	The second chapter of this research explores the requirement of SOX 404, internal control system, risk of the ERP system, the effect of computer-support auditing techniques, the disadvantage of generalized audit software, and the like. The researchers reorganize 8 activities and 43 auditing items based on the domestic and foreign scholars' studies and experts' opinions.	Phase 3	It produces the replaceable initial design to meet the requirements set by SOX 404. After comparing the substitute plans, the researchers came up with the best solution, in which organizations are willing to pay the expense, manpower, and technique costs during the development of the system.	The second chapter of this research reorganizes the risk of ERP and the disadvantages of generalized audit software. It was found that although auditing personnel can support daily auditing using the generalized audit software, they tend to give up using it since the technique is difficult..
Phase 2	According to the relations mentioned in Phase 1, it eliminates any repetitions to study their requirements and structures.	The regulation of SOX 404 emphasizes that management units must effectively implement an internal control system and validate its effectiveness. It relies on auditing methods. When auditing personnel face problems with time, they have to rely on computer-support auditing techniques and the generalized audit software for quick audit internal control. But given the complicatedness of computer applications, accountants might not be able to acquire data directly from the database.	Phase 4	It analyzes the output of the phase. Once the plan is supported, what will follow is the preparation for the hardware and software needed.	In the fourth chapter, this research analyzes the validity of 43 auditing items based on the responses of experts from various sectors to the expert questionnaire. In addition, the chapter discusses the validity of 34 auditing items of purchasing and expenditure cycle needed for the development of the auditing software for use by auditing personnel.

Table 4: Comparison between System Analytical Phases and the Process in this Research

The third phase of SDLC is system design. Figure 3 shows the system layout and framework planning chart of this research. Once the auditing personnel system is implemented, users will be asked to key in the account numbers and secret codes of the Oracle ERP database for validation. When the validation fails, the selection will not appear and all extended selection, buttons, and functions cannot be used. If the validation succeeds, the system will start two processes: (1) downloading the auditing items recorded in LoadMenu.XML file as the auditors' selection and showing the auditing items in the selection; and (2) reading the information of all account books, organizations, and plants in the Oracle ERP database and showing them in the auditing organization selection for the auditing personnel to select the account books audited and find the organizations and plants.

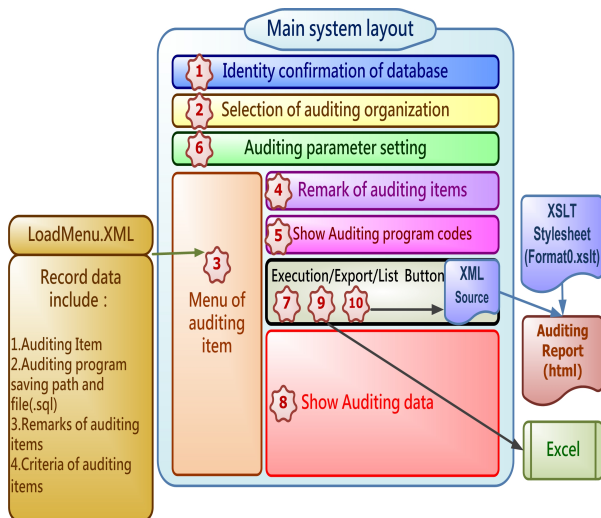


Figure 3: System Layout and Framework Operational Logic

6 VALIDATION OF APPLICABILITY OF THE COMPUTER AUDITING SYSTEM

6.1 Methods, Purposes, and Scope Setting of Validation

The study evaluated six aspects of the proposed auditing system (function, reliability, utility, efficiency, maintenance, and portability) and 20 sub-characteristic evaluation items of the “ISO/IEC 9126 software quality assessment criteria model” proposed by International Organization for Standardization (ISO) (2001) and Punter et al., (1997). The software quality assessment criteria model provides a conceptual guidance, which quantitatively and qualitatively suggests a concrete observation base and objective indexing. Jung (2007) showed that ISO/IEC 9126 efficiently increases users’ measurement quality of software satisfaction. The case study approach for the system validation was used, and the researchers identified the best practices and their views of the computer auditing system from the case firms. Through the interviews and system testing, the cause-and-effect relationship of the users and system were collected and analyzed. The case study, therefore, addressed the suitability and effectiveness of the computer auditing system.

6.2 Empirical Data Analysis and Discussion

As earlier discussed, the target subjects of this case study were public firms in Taiwan. Among them were two well-known public firms involved in the industry of metal furniture and decoration manufacturing (A Firm), and telecommunications and communications (B Firm). A brief description of these two case firms is shown in Table 5. Table 6 shows the background information of the interviewee from the two firms.

Target firms	A Firms	B Firm
Corporate scale	Public firm Capital: NT\$1.91 billion Annual business volume: NT\$5.94 billion 1,200 employees	Public firm Capital: NT\$1.62 billion Annual business volume: NT\$18.9 billion 1,900 employees
Main products	Metal furniture manufacturing and sales Lock and door metal (door closure), manufacturing, sales, and surface dealing industry	Wireless personal communication system Satellite direct aerial (including flat aerial) Products such as Bluetooth, IEEE 802.11b
Corporate vision of operational idea	To accelerate the development of innovative products with high techniques upon three corporate spirits "innovation, service and quality". It provides more reliable high-quality products and develops the bases around the world to provide more rapid and complete services.	Becoming [the pioneer of wireless internet technique]
On-line date of ERP system	2006/7/1	2006/1/1
Accountant office	PWC	KPMG

Table 5: Background Information of Target Firms

Target firms	Interview date	Number of Respondents	Positions	Seniority in the field	Average seniority	Total average seniority
A	2007/4/27	3	General manager	24 years	14 years	10 years
			Chief auditor Wu	5 years		
			Information director Tsai	12 years		
B	2007/5/1	3	Chief auditor Chen	8 years	7 years	
			Information personnel Chan	8 years		
			External auditing manager Lee	6 years		

Table 6: Background of the Respondents

6.2.1 Assessment of the ERP Auditing System

In this study, the interview focused on 20 sub-characteristics of ISO/IEC 9126 and consisted of questions that were answered with "Yes" or "No." The respondents' answers are thoroughly presented in Table 7.

6.2.2 Influence and Contribution of the ERP Auditing System on Target Firms

Besides software quality, Mr. Wu and Mr. Chen thought that the software can actually save plenty of time and money. Mr. Wu said that "if the software has satisfying logic and design, then it is more convenient than Excel. When using Excel, we must continuously acquire data from information personnel. With this new system, we can audit the abnormal data with few auditing items, not to mention the time and money saved and the accuracy of the work."

Mr. Chen further commented that "when using this system, we only needed to press the button for the result of the related auditing in so short a time. We did not have to ask for data from information personnel because of the change of auditing zones. When information personnel are busy, it sometimes takes long time to successfully finish the auditing."

With regard to the comparison between this system and the generalized audit software, Mr. Wu commented that this system is actually more practical. Mr. Chen, likewise, said, "This system is excellent. We did not find the auditing software suitable in accomplishing the audits. With the new system, auditing personnel can set up the selection of account books, business units, plants and auditing zones in software to audit the data in the system... Auditing personnel do not have to ask for data from information personnel given the inconsistent auditing time. They also do not need to worry about the suspension of auditing when someone from the information department is on leave. In

addition, the software also provides for the shift of data in Excel format to another format with the same desired statistical function.”

Quality characteristics	Sub-characteristics: characteristic description	The respondents' opinions	
		Atarget firms	Btarget firms
Function	Propriety: Do the existing functions meet the requirements?	Yes	Yes
	Preciseness: Can the system provide accurate answers?	After small-scale test, the present system can provide proper information to support auditing	Yes
	Exchange: Can the system exchange with designated systems?	Yes	Yes
	Compliance: Can the system follow the related criteria, switch or regulations?	Yes	Yes
	Security: Can the system establish non-authorized saving program or data?	Yes	Yes
Reliability	Maturity: Is the executive failure due to the errors in the system frequent?	According to the report of IT test, there were no errors in the system. It was stable.	We did not find any failure execution of the system.
	Error tolerance: Is the system capable to maintain software efficacy with the errors in the system or input error against interface definition?	Yes	Yes
	Recovery: Is the system quick enough to recover efficacy and data in case of errors?	This system did not meet the assessment of this item.	This system did not meet the assessment of this item.
Usability	Comprehension: Do the users' assessments meet the logic and application of the software?	Yes	Yes
	Learning: Do the users exert efforts in learning software program?	Yes	Yes
	Operation: Do the users find it easy to use and control the system?	Yes	Yes
Efficiency	Time performance: Is the system fast and output rate satisfactory?	Good!	Not bad.
	Resource use: Is the the function continuously using the resources efficient?	It will require long-term observation in implementation. The message related to human-computer interface in the system is still unclear. For example, after implementation, the system cannot inform the users of proper information when there is not abnormal data.	It will not influence other business.
Maintenance	Analysis: Can the system analyze errors or analyze their causes?		Yes
	Modification: Does the system have the capacity to comply with the modified environment	Yes	Yes
	Stability: Can the system meet the modification and lead to unexpected results?	Yes	Yes
	Test: Is it easy to test the system after modification?	Yes	Yes
	Adaption: Can the software system be transferred to other environments without modification?	Yes	Yes
portability	Installation: Is it easy to install the system in different environments?	Yes	Yes
	Replacement: Is it easy to replace the system?	There is no substitute software if the system is replaced.	There is no substitute software if the system is replaced.

(Auditors and information personnel in the target firms are the respondents)

Table 7: Record on the Interview of this System Examined by ISO/IEC 9126 Software Assessment Criterion

Mr. Lee, external auditor of Target Firm B had this to say: “This auditing system is excellent. It is the software we expect. I understand it is not easy to construct such an auditing system and that it requires in-depth knowledge on ERP system, yet we believe that it will be the star in the field of computer auditing.”

As to whether or not the system is complaisant to the requirements set by the Sarbanes-Oxley Act of 2002, Mr. Wu said that SOX 404 mainly requires the implementation of an internal control system and a demonstration of the effectiveness of implementation: “We can actually audit the abnormal data by

this system and immediately modify the abnormality. This system, indeed, conforms to SOX 404 provisions.”

Mr. Chen said, “If we can continue developing other business cycles, auditing will certainly be accelerated and accomplished more accurately correctly. We can also modify properly some irregularities that deviate from the requirements of pertinent laws. Thus, auditing by this system can demonstrate the implementation effectiveness of internal control system to meet the regulation of SOX 404.”

Finally, the personnel in the target firms also suggested that the system be improved. Mr. Wu said, “It will be better to construct eight cycles. In my overall auditing, I figured only one cycle was not helpful. Besides... the system should give cues during and at the end of auditing work to inform users of the present auditing.”

Mr. Chen suggested that “the complete auditing items of eight cycles will help the auditing personnel. We could recommend this software to internal auditing association, which can promote this useful auditing software.”

Mr. Lee said: “Besides the complete auditing items of eight cycles, we suggest the construction of auditing on the authorization of some programs. For example, we might want to know if a concerned personnel who is not in the procurement department fills in procurement forms or the personnel not from the financial department use the functions in payment module.”

7 CONCLUSIONS AND SUGGESTIONS

The SOX 404 requires that management must construct, implement, and maintain effective ICOFR. In addition, SOX 404 requires that the external auditor must propose an assurance report on the effectiveness of ICOFR. In this study, the development of the computer auditing system used was based on the Gowin's Vee research strategies, which suggest the combined knowledge of accounting and information technology to yield more positive results and generate better performance. The theatrical results shown eight proposed activity constructs and 34 auditing control items in the purchasing and expenditure cycle, which are necessary for system development. The researchers then established this system using the four phases of SDLC by further employing the case study method on two chosen public firms to validate the applicability of the system. The interview results obtained from the case firms agreed on the usefulness of the system to facilitate their company internal control. The system was found it can provide management and external auditors with the ability to identify incorrect financial statements and fraudulent activities. In conclusion, the suggested computer auditing system complies with the requirements set forth by SOX 404. It also improves the correctness of the auditing activities, thereby increasing the reliability of the company's investment and management environment. Finally, we believe this study can contribute to the development of a sufficient and manageable computer auditing system and future research can also expand other business cycle in the same way to reinforce the completeness of this computer auditing system.

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