

THE RELATIONSHIP BETWEEN THE INFLUENCE FACTORS AND THE AUDITOR'S USE OF EDP AUDIT TECHNIQUES IN KOREAN ACCOUNTING FIRMS

JONG-MIN CHOE

School of Business Administration,
KyungPook National University, Taegu 702-701, Korea.

ABSTRACT

The objectives of this study are to suggest and empirically prove the relationship model for investigating influence factors on the use of EDP audit techniques, and to identify moderating effects of the task types of EDP audit on the relationships between the influence factors and the use of EDP audit techniques.

The results of the empirical test suggested that there are significant (positive or negative) correlations between the use of some EDP audit techniques and the influence factors, such as audit education, auditor's familiarity and age, and effectiveness of the technique, etc. The significant differences in the use of EDP audit techniques were empirically proved in the ratio of audit fees and the audit structure. It was also proved that the relationships between the use of techniques and the influence factors are different according to the task types of EDP audit. This study proposed the technique and the auditor related implications of these findings for the successful fulfilment of EDP audit.

1. INTRODUCTION

The increasing sophistication of computer technology has resulted in the development of highly complex and sophisticated information processing environments that require greater expertise of an external auditor. In these environments, an external auditor must understand computer technology and apply computer-assisted audit techniques to fulfill his or her audit objectives.

Today, more importance is being placed on the use of the electronic data processing (EDP) audit techniques than in the past, and the systematic studies on the auditors' use or selection of EDP audit techniques are required [24]. However, very little research has been done to explain external auditors' use of

specific EDP audit techniques. A few studies suggested taxonomy of EDP audit techniques and examined the benefits and the costs of each EDP audit technique [e.g. 10, 36]. Some other research empirically tested certain factors that may explain the use or non-use of particular EDP audit techniques [e.g. 18, 24].

Amer, Bailey and Prabuddha [4] presented broad research topics of EDP audit techniques, and they suggested the fact that the research addressing EDP audit techniques appears sporadically and somewhat infrequently. Garsombke and Tabor [18] empirically tested the relationships between the use of EDP audit techniques and the technique related variables, such as the perceived cost, the skill and the effectiveness of EDP audit technique. In the study of Lovata [24], it was found that the extent of use of EDP audit techniques is influenced by the audit structure of an accounting firm.

In the previous research, only a few studies examined influence factors on the selection of EDP audit techniques by the external auditors, and these studies considered only one or two influence factors, such as audit structure or audit technique related factors. Moreover, in examining influence factors, the prior studies have been lacking in any theoretical underpinnings. Theoretical reasonings were also lacking for explaining the relationships between the influence factors and the use of EDP audit techniques. The prior studies empirically analyzed the simple relationships without any concrete theory base.

This paper represents an exploratory effort to empirically test the relationships between the various influence factors and the external auditors' use of EDP audit techniques in Korean accounting firms through the quasi-experimentation. Thus, the objectives of this research are : to suggest a relationship model for examining influence factors on the use of EDP audit techniques by the external auditors, based on the existing audit studies ; to empirically prove the relationships between the influence factors and the use of EDP audit techniques ; to identify moderating effects of the task types of EDP audit on the relationships ; and to suggest techniques related implications of these findings for the successful fulfilment of EDP audit.

2. AUDIT QUALITY AND AUDIT TECHNIQUES

2.1 Audit quality

The audit quality is defined as the market-assessed joint probability that a given auditor will both (a) discover a breach in the client's accounting system,

and (b) report the breach [15]. The probability that a given auditor will discover a breach depends on the auditor's technical capability or the audit techniques used, the audit procedures employed on a given audit and the extent of sampling, etc. The conditional probability of reporting a discovered breach is a measure of an auditor's independence from a given client [15]. Hence, it is suggested that the technical capability of an auditor, the audit techniques employed and the auditor's independence are the determinants of audit quality.

Many studies suggested the surrogate measures of audit quality and the influence factors on audit quality [e.g. 15, 16, 17, 21]. DeAngelo [15] argued that the audit firm size measured by the number of clients and the percentage of audit fees dependent on one client are surrogate measures of audit quality. It is posited that accounting firms earn client-specific quasi-economic rents due to technical advantages of incumbency [17]. Larger firms stand to lose more client-specific quasi-economic rents if a loss in reputation occurs because they have more clients. For this reason large firms have a greater incentive to supply higher quality audits in order to avoid a loss in reputation, and thus accounting firm size serves as a proxy for audit quality.

Francis [17] empirically tested the effect of audit firm size on audit prices. He found the fact that large audit firms (i.e. Big Eight) have significantly higher audit prices than small firms (i.e. non-Big Eight), because large firms have the distinguished technical capabilities and so, they can supply the differentiated and higher quality audits. Francis [17] also proposed that audit quality is related to audit firm size. In the study of Palmrose [29], the litigation activities of external auditors were used as a quality surrogate. He empirically proved that non-Big Eight firms as a group have higher litigation activities than Big Eight firms. This result suggested that Big Eight firms can provide higher quality audits than non-Big Eight firms.

Deis & Giroux [16] empirically tested the influence factors on audit quality in the public sector. The study presented that the auditor tenure with the same client, the audit firm size, the size and financial health of the client and the audit hours spent on the engagement have significant effects on audit quality. They also concluded that the effect of audit hours on audit quality is predominant, and so, audit hours seem to be an acceptable surrogate for audit quality. In the other studies [e.g. 11, 20], the audit firm size, the length of auditor tenure, the audit team and firm experience with the client, the industry expertise of an audit team and the responsiveness to client needs, etc., were empirically suggested as the influence factors on audit quality.

2.2 The Relationships among Audit Quality, Audit Techniques and Influence Factors

The audit techniques used are one of influence factors on audit quality. However, the audit techniques employed and the independence of an auditor are the first determinants of audit quality [15].

Testing the relationships between audit firm size and audit prices, Francis [17] suggested that higher quality audits of large firms are caused by the technical advantages of larger firms. The smaller litigation activities of Big Eight firms than those of non-Big Eight firms also result from the technical competence of Big Eight firms [28, 29]. Kinney [21] proposed that the organizational factors related to the choice of audit techniques are audit firm size, ratio of audit fees to total fees and audit staffing (ratio of audit staff to audit partners). Deis & Giroux [16] also suggested that the first determinant of audit quality is the audit techniques employed, and the influence factors on the use of audit techniques are auditor experience, education, professionalism and audit structure. The other study [20] also found that the length of auditor tenure and the audit structure correlate with the technical capabilities of audit firms.

Based on the prior studies, it is proposed that the influence factors, such as auditor experience, education, length of auditor tenure, audit firm size and audit structure, etc., have indirect effects on audit quality through the use of audit techniques.

3. THE INFLUENCE FACTORS ON THE USE OF EDP AUDIT TECHNIQUES

3.1 Classification of EDP Audit Techniques

Audit techniques are classified into two broad groups, such as traditional audit techniques under the manual system and EDP audit techniques. EDP audit techniques are one broad type of audit techniques.

EDP audit techniques can be also grouped together into two categories. Two classifications that seem to be appropriate are static/discrete techniques and continuous/concurrent techniques [36]. The static/discrete techniques allow the auditor to address verification issues at a specific point. The continuous/concurrent techniques allow the auditor to monitor the application system on a continuous basis, and concurrently with data processing. The static/discrete techniques include test data and parallel simulation. The continuous/concurrent

techniques include integrated test facility, snapshot method, tracing and mapping.

EDP audit techniques are classified into two groups according to the task characteristics of EDP audit. Two groups are the techniques for the program verification and the techniques to verify the outputs of processing [1, 10]. EDP audit techniques for the program verification include integrated test facility, tracing, mapping, test data and parallel simulation, etc. The techniques for verifying the outputs of processing are embedded audit module, generalized audit software and utility program.

3.2 The Influence Factors

There have been very few studies to examine influence factors on the use of EDP audit techniques. In the study of Garsombke & Tabor [18], technique related factors and auditor related factors were considered as influence factors. The technique related factors were the cost to use the technique, the skill required and the effectiveness of the technique. The auditor-related factors are the characteristics of an individual auditor. The two auditor-related factors were the auditor's familiarity with the technique and the auditor's classification as either an internal or external auditor. Garsombke & Tabor [18] empirically suggested that the perceived effectiveness of the technique is the factor to be most related to the extent of use.

EDP audit techniques are types of audit techniques. Hence, it is assumed that the factors affecting on the use of audit techniques also influence on the use or selection of EDP audit techniques. Various influence factors on the use of EDP audit techniques can be suggested, and the factors are classified into three categories. The three categories of influence factors are the personal factors, the audit technique related factors and the audit firm specific factors. The personal factors include auditor experience, education, length of auditor tenure and auditor age, etc. The technique related factors are the cost of using the technique, the skill required and the effectiveness of the technique. The firm specific factors are audit firm size, ratio of audit fees, audit structure and type of audit firm, etc. In table 1, the influence factors of each category are presented with their related studies.

3.3 Moderating Effects of the Task Types of EDP Audit

The EDP auditor's responsibilities in evaluating the internal controls and the results of the processing of accounting data may be classified as follows; understanding the system, program verification and output verification. For the

Table 1. The influence factors on the use of EDP audit techniques

Personal factors	Technique related factors	Firm specific factors
<ul style="list-style-type: none"> • Auditor experience [2, 8, 23] • Education [16] • Length of auditor tenure [11, 30, 34] • Auditor age [20] • Auditor's Familiarity with the tool [18] • Type of auditor: Internal/ External auditor [1, 18] 	<ul style="list-style-type: none"> • The cost to use the technique [18] • The skill required [9, 18] • The effectiveness of the technique [18] 	<ul style="list-style-type: none"> • Audit firm size [20, 21, 30, 32] • Ratio of audit fees [15, 21] • Audit structure [7, 24, 26, 31] • Audit staffing [21] • Other factors [11] • Type of firm: Big-Six/ non Big-Six firms [17, 29]

task of program verification, specific EDP audit techniques, such as integrated test facility, parallel simulation and test data, are used. Other particular EDP audit techniques, such as generalized audit software, utility program and embedded audit module, are needed for the task of output verification. Hence, the use or selection of EDP audit techniques is influenced by the task characteristics of EDP audit.

Though the task characteristics have a direct effect on the use of EDP audit techniques, the task characteristics may adjust the effects of influence factors on the use of EDP audit techniques. Some studies empirically proposed that the audit task characteristics have a moderating effect on the relationships between the influence factors and the audit performance or audit quality. Abdolmohammadi & Wright [2] found the fact that the impact of auditor experience on audit judgments is different according to the degree of task complexity. The results suggested that task complexity is an important factor that should be considered explicitly in investigating experience effects on audit performance.

Bamber & Snowball [7] examined the effects of audit structure on the audit judgments and the auditors' use of coordination and control mechanisms, under different degrees of task uncertainty. In their study, it was suggested that relative to unstructured firms' auditors, the auditors from structured firms increase their use of certain control and coordination mechanisms as the level of task uncertainty increases. Other studies [e.g. 9, 19, 23] also suggested that the relationships between influence factors and audit performance are contingent on the task characteristics.

In the use of EDP audit techniques, the impacts of influence factors are different according to the task types. When the task is a program verification, influence factors have a greater effect on the use or selection of audit

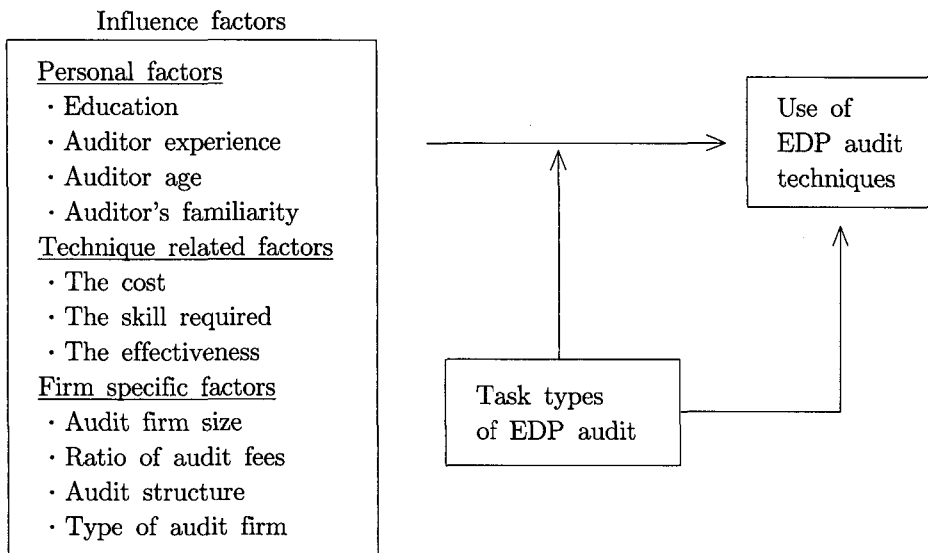


Figure 1. Research Model

techniques verifying application program. However, if the task is an output verification, influence factors have a more impact on the use of EDP audit techniques verifying outputs of processing. From the relationships among influence factors, audit techniques used and audit quality, and from the above reasoning, it is assumed that the task types of EDP audit have a moderating effect on the relationships between the influence factors and the use of EDP audit techniques.

In this study, auditor experience, education, auditor age, auditor's familiarity with the technique, audit firm size, ratio of audit fees, audit structure, type of audit firm, cost to use the audit techniques, skill required and effectiveness of the techniques, which have been investigated critically in previous influence factor researches [e.g. 16, 18, 21, 23, 24, 29], were also included as main influence factors. The research model in this study is represented in figure 1.

4. HYPOTHESES

The hypotheses in this study describe the direct relationships of the influence factors and the use of EDP audit techniques, and the moderating effects of the task types of EDP audit on the relationships.

4.1 The Relationships Between the Personal Factors and the Use of EDP Audit Techniques

The audit education, especially, EDP audit education improves the auditor's computer ability and application of EDP audit techniques. With audit education, auditors can acquire the ability to understand and apply the EDP audit techniques, and this ability can lead to more use of EDP audit techniques.

Auditor experience influences on the acquisition of knowledge and skill to perform the audit tasks [12]. Experienced auditors have much more knowledge than inexperienced auditors about the relevant audit techniques. Hence, the auditors, who have more experiences in EDP audit and more knowledge about the EDP audit procedures, may use the EDP audit techniques more frequently.

In Korean accounting firms, aged auditors do not belong to computer generation. They are not proficient in the use of computer system, and they are deficient in the knowledge and ability about EDP audit. Aged auditors are generally reluctant to use the EDP audit techniques. So, an auditor's age may negatively correlate with the use of EDP audit techniques.

The auditor's familiarity with the specific audit technique means that he knows more about that technique and has used the specific technique more often. The familiarity is probably enhanced through more use and the familiarity can be lead to more use of specific technique [18]. Hence, it is suggested that the auditor may make more use of familiar EDP audit technique as long as the other techniques are equal in collecting EDP audit evidence. Based on the above arguments, Hypothesis 1, 2, 3 and 4 are presented.

Hypothesis 1 : The audit education is positively related to the use of EDP audit techniques.

Hypothesis 2 : Auditor experience is positively related to the use of EDP audit techniques.

Hypothesis 3 : Auditor age is negatively related to the use of EDP audit techniques.

Hypothesis 4 : The auditor's familiarity with the technique is positively related to the use of EDP audit techniques.

4.2 The Relationships Between the Technique Related Factors and the Use of EDP Audit Techniques

To increase audit efficiency, the auditor should use the techniques that minimize the audit costs in achieving the audit objectives successfully [35]. If a technique produces the audit costs that can not be accepted, the auditor should

find other alternative techniques. Hence, the cost to use the technique negatively correlates with the use of EDP audit techniques.

The auditor's skill level has an effect on the audit performance according to the degree of task complexity [9]. For the fulfilment of audit objectives and the use of audit techniques, the auditor should have the adequate skill level. If the auditor does not possess the skill required to use the technique, he can not use the technique and should find alternative means.

To accomplish auditor's responsibilities, the auditor should use the effective audit technique in performing a specific audit task. The effectiveness of the audit technique is directly related to the fulfilment of audit objectives. The auditor should select or use the technique from the perspective of attaining of audit objectives.

On the basis of the above findings, Hypothesis 5, 6 and 7 are proposed.

Hypothesis 5 : There is negative relationship between the cost to use the technique and the use of EDP audit techniques.

Hypothesis 6 : There is negative relationship between the skill level required to use the technique and the use of EDP audit techniques.

Hypothesis 7 : There is positive relationship between the effectiveness of the technique and the use of EDP audit techniques.

4.3 The Relationships Between the Firm specific Factors and the Use of EDP Audit Techniques

Larger audit firms can provide higher quality audits, and this higher audit performance results from the technical competence of large firms. As a technical competence, a larger firm is, also, able to supervise the audit procedures of its auditors and review the auditors' works better than a smaller firm [32]. In larger audit firms, the elaborate audit techniques and procedures can be prepared and executed. So, in the large audit firms the sophisticated EDP audit techniques may be more utilized than in the small firms.

As the ratio of audit fees to total fees and the firm's number of clients increase, an audit firm makes an effort to improve audit quality because of firm's concern for reputation and income. [17, 21]. If the ratio of audit fees to total fees is high, the income of an audit firm is more dependent on audit task than other tasks, such as management service and tax. Hence, in audit firms that have a high ratio of audit fees to total fees, the elaborate and adequate EDP audit techniques may be more used for the attainment of higher quality audit.

Cushing & Loebbecke [14] characterized audit technologies by the degree of structure implicit within them. The more structured firms provide extensive

guidance regarding the use of EDP audit techniques, and audit firms employing a structured audit technology can provide a more elaborate audit product than unstructured firms [13]. Highly structured firm may be more likely to use decision aids and audit techniques, since they offer efficient means for prescribing audit processes and behavior. Hence, the use of EDP audit techniques in the structured audit firms may be greater than that of unstructured firms.

Type of audit firm (Big Six/ non-Big Six firms) has an effect on audit quality or audit performance. The audit quality of Big Six firms is better than that of non-Big Six firms [22, 29]. Better audit quality of Big Six firms is caused by the use of structured audit techniques and the technical advantages of Big Six firms. The use of structured audit techniques in Big Six firms may be lead to more use of sophisticated EDP audit techniques.

Based on the previous findings, Hypothesis 8, 9, 10 and 11 are presented.

Hypothesis 8 : The use of EDP audit techniques in large audit firms is greater than that of small firms.

Hypothesis 9 : The use of EDP audit techniques in audit firms having a high ratio of audit fees to total fees is greater than that of audit firms which have a low ratio.

Hypothesis 10 : The use of EDP audit techniques in structured audit firms is greater than that of unstructured firms.

Hypothesis 11 : The use of EDP audit techniques in Big Six firms is greater than that of non-Big Six firms.

4.4 Moderating Effects of the Task Types on the Relationships

Influence factors have a different impact on the audit quality according to the audit task characteristics. Under different degrees of task complexity or task uncertainty, the effect of influence factors on audit quality changes. The task types of EDP audit are influence factor on the use of EDP audit techniques. According to the task types of EDP audit, the audit techniques needed are different, and the influence factors, such as personal factors, technique related factors and firm specific factors, have a different effect on the use of EDP audit techniques.

Hypothesis 12 : The relationships between the influence factors and the use of EDP audit techniques are different according to the task types of EDP audit.

5. RESEARCH METHOD

5.1 Sampling

In Korean accounting firms, firm types can not be classified as Big Six and non-Big Six firms. However, there are two types of audit firms. One type is audit firms cooperated with foreign Big Six firms, such as Arthur Young, Arthur Anderson, Coopers & Lybrand and Price Waterhouse, etc. This type of audit firms is named as "International firm". International firms are Big Six firms in Korea. Other type of firms is independently founded audit firms. Independently founded firms are called as "Local firm". Local firms are considered as non-Big Six firms.

There are 2,800 working external auditors (certificated public accountants) in Korea. Among these, 2,000 auditors belong to International firms, and 800 auditors are working in Local firms. One hundred twenty auditors were randomly selected from eight International firms, and forty auditors were randomly sampled from seven Local firms. The 86 auditors of International firms and 23 auditors in Local firms responded to the request for cooperation and finally participated in the study.

Data were gathered by the interviews based on structured questionnaires. The questionnaires for measuring the use of EDP audit techniques and the previously discussed influence factors, were prepared for the study. A brief summary description of the auditors participating in the study is presented in table 2.

Table 2. Sample characteristics

Years of Audit Experience	1	2 - 5	6 - 10	11 - 20	21 -	Total	
Person	26	49	23	9	2	109	
Age	- 25	26 - 30	31 - 35	36 - 40	41 - 50	50 -	Total
Person	5	49	34	17	2	2	109

5.2 Measurement

The use of EDP audit techniques; This study considered six EDP audit techniques which have been generally used in the EDP audit tasks. The six EDP audit techniques are integrated test facility, parallel simulation, test data,

embedded audit module, generalized audit software and utility program. In Korea, the history of EDP audit is somewhat short, and the external auditors make little use of EDP audit techniques. So, we measured the external auditors' perceived use of EDP audit techniques, rather than actual use, under the condition that the auditors are performing EDP audit tasks. The external auditor's perceived use of each EDP audit technique was measured on a seven point rating scale.

The personal factors; Auditor education was measured by the hours spent on the EDP audit education and the number of completed EDP related courses in the college. Auditor experience can be measured by the number of years in public accounting or the hierarchical level in the firm [5]. In this study, auditor experience was measured by the number of years of EDP audit experience and years of audit experience. Auditor's perceived familiarity with each EDP audit technique was used as the measure of auditor's familiarity, and it was measured on a seven point rating scale.

Technique related factors; As the measures of technique related factors, perceived relative cost, relative skill required and relative effectiveness of each EDP audit technique in performing EDP audit tasks were used. They were measured on a seven point rating scale.

Firm specific factors; There are two measures of audit firm size. One is number of clients [15], and another is number of auditors [30, 31, 33]. In this study, audit firm size was measured by the number of auditors in audit firm.

Audit structure is defined as the degree to which audit firms use structured audit approaches, and it encompasses elements of both structure and technology [6, 7]. Audit structure can be measured by four question items, such as level of establishing audit plans or audit procedures, degree of following audit plans, steps or procedures established, extent of discretion permitted in performing audit tasks, and degree of relying on checklists and flowcharts for all phases of the audit [6, 20, 21, 24]. Audit firms differ considerably along a structured-unstructured continuum. In this study, audit structure of a firm was measured on seven-point Likert type scales.

Task types of EDP audit; Two task types were selected in this study. One type is the task of program verification, and the other type is the task of output verification. Under each task type, perceived relative effectiveness and perceived use of EDP audit techniques were measured on a seven point rating scale.

6. RESULTS

6.1 Reliability and Validity Tests

Reliability test; Item analyses were performed with Cronbach Alpha coefficients for the multi-item scale measure. In the first analysis, the Alpha value of audit structure was 0.8117. If Alpha coefficient is above 0.7, the reliability of multi-item scale is satisfactory [27]. Because of the high coefficient value, we were encouraged to utilize composite measure obtained by computing the arithmetic mean of individual item scores in further analyses.

To test reliability of single item measures, test-retest method was used. Twenty five auditors have responded to the single item questionnaires, and one month later, the same auditors responded again. The correlation between the first response and the second was analyzed. The results of nonparametric correlation analyses are presented in table 3.

Except for the cost item of the generalized audit software and parallel simulation, all test-retest reliability coefficients were satisfactory. In the cost item of the generalized audit software and parallel simulation, there were no differences between the first answer and the second, as it were, the value of the first was almost equal to that of the second. Hence, the correlation coefficients could not be calculated.

Validity test; The questionnaire items for measuring audit structure were used in the previous empirical works. However, the construct validity of these items was questionable. So, to confirm the theoretical grouping of items for measuring audit structure, data from the questionnaire were factor analyzed.

The principal component factor analysis using VARIMAX rotation was performed. One factor with eigen value greater than one was extracted. Table 4

Table 3. The results of test-retest (Kendall τ)

Item	Technique	ITF	PS	TD	EAM	GAS	UP
Cost question item		.550***	—	.465***	.644***	—	.408**
Skill item		.349*	.473***	.416**	.516***	.634***	.532***
Familiarity item		.405**	.395**	.389**	.343*	.486**	.397**
Effectiveness item		.400**	.443**	.364*	.394**	.356*	.477***

ITF(Integrated test facility), PS(Parallel simulation), TD(Test data), EAM(Embedded audit module), GAS(Generalized audit software), UP(Utility program).

* : $P \leq 0.1$, ** : $P \leq 0.05$, *** : $P \leq 0.01$

Table 4. Factor loadings of audit structure (Varimax rotation)

Item	1	2	3	4	Percentage of variance	Eigen value
Factor loadings	.9298	.9141	.7773	.8025	73.7%	2.95

shows the factor loadings, the percentage of variance explained by one factor. A single scale for the audit structure was constructed by averaging a respondent's scores over the items.

6.2 The Relationships Between the Influence Factors and the Use of EDP Audit Techniques

Pearson correlation analysis was employed to assess the relationships among critical variables. Table 5 presents the correlation matrix between the personal and technique related factors and the use of techniques. There were statistically significant positive relationships between the hours of EDP audit education and the use of generalized audit software and test data. Significant positive correlations were also observed among the use of generalized audit software, embedded audit module and integrated test facility, and the number of EDP courses completed. Hence, it is concluded that the EDP or EDP audit education can increase the auditor's use of some techniques.

The relationships between the EDP audit experience and the use of techniques were not significant. In Korea, the history of EDP audit is rather short, and the EDP audit experience of the external auditors is very superficial. In this situation, the experience effect on the use of techniques was not supported.

Significant negative correlations between the audit experience and the use of embedded audit module, integrated test facility and utility program were presented. The reason for negative correlation is that audit experience is strongly related to auditor age (i.e. correlation coefficient is 0.842, $P=0.001$) and the auditor age has a negative impact on the use of techniques. The significant negative correlations of the auditor age and use of embedded audit module, integrated test facility and utility program supported the negative effect of auditor age.

Auditor's familiarity significantly correlated with the use of parallel simulation, generalized audit software and utility program. Hence, if the auditor is more familiar with the technique, the auditor's use of that technique increases.

In the Hypothesis 1, 2, 3 and 4 which relate the personal factors to the

Table 5. Relationships between the personal and technique related factors and the use of techniques (N=86)

Personal factors	Usage	ITF	PS	TD	EAM	GAS	UP
Education hours		.100	.107	.145*	-.012	.267***	.089
EDP courses		.155*	.033	.028	.140*	.136*	.084
Years of EDP audit experience		-.030	.050	.097	-.103	.050	.051
Years of audit experience		-.224**	-.079	-.116	-.175*	-.044	-.239**
Auditor age		-.191**	-.063	-.104	-.198**	.027	-.200**
Auditor's familiarity		.081	.143*	-.026	.046	.133*	.388***
The cost		-.124	.006	-.111	.075	-.181*	-.161*
The skill required		-.082	-.165*	-.087	-.101	-.166*	-.303***
The effectiveness		.135*	.255***	.606***	.229**	.369***	.148*

ITF(Integrated test facility), PS(Parallel simulation), TD(Test data), EAM(Embedded audit module), GAS(Generalized audit software), UP(Utility program).

* : $P \leq 0.1$, ** : $P \leq 0.05$, *** : $P \leq 0.01$

use of techniques, Hypothesis 1, 3 and 4 were partially supported by the results.

There were significant negative relationships between the cost and skill required and the use of generalized audit software, utility program and parallel simulation. So, if the cost of using the technique and the skill level required are high, the use of that technique by the external auditors is decreased. The correlations between the effectiveness of the technique and the use of six EDP audit techniques were significant and positive. Positive correlations mean that the auditor's use of technique also increases as the effectiveness of the technique increases.

In Hypothesis 5, 6 and 7, that propose the relationships between the technique related factors and the use of techniques, Hypothesis 5 and 6 were partially and Hypothesis 7 was completely supported.

To test the difference of the use of EDP audit techniques according to the conditions of firm related factor, T-test and Mann-Whitney test were used. For the difference test, the observations of firm specific factors, such as firm size, ratio of audit fees and audit structure, were divided into two groups with the median value being employed as the dividing point.

In the sample firms, the firms below the median value of firm size are the small firms group, and the other firms above the median value are the large firms group. The results for the firm size Hypothesis were represented in Table 6. Except for utility program, there were no significant differences between the large firms and the small firms. Hence, the proposition that large firms make more use of EDP audit techniques than small firms can not be accepted.

Table 6. Results of T-test (Firm Size)

Use of technique	Firm size	Large firm(n=46)	Small firm(n=44)
Integrated test facility		mean: 3.58 t= .71	mean: 3.80
Parallel simulation		mean: 3.97 t= -.84	mean: 3.70
Test data		mean: 4.53 t= -.96	mean: 4.22
Embedded audit module		mean: 3.41 t= .11	mean: 3.45
Generalized audit software		mean: 4.75 t= -.45	mean: 4.60
Utility program		mean: 4.35 t= -1.46 [*]	mean: 3.85

* : $P \leq 0.1$

Though large firms have a technical competence in auditing, this result suggests that the technical competence of large firms does not lead to more use of sophisticated EDP audit techniques. It is assumed that the use of EDP audit techniques is influenced by the other firm related factors.

For the ratio of audit fees Hypothesis, the results of T-test were presented in Table 7. Significant differences between the high ratio firms and the low ratio firms were found in integrated test facility and generalized audit software. The high ratio firms make more use of integrated test facility and generalized audit software than the low ratio firms. Hence, it is suggested that the higher the ratio of audit fees to total fees, audit firms make more use of sophisticated EDP audit techniques because of their dependent on audit fees.

The impact of audit structure on the use of EDP audit techniques was empirically tested, and the results were represented in Table 8. There were significant differences between the structured firms and the unstructured firms except for generalized audit software, and in structured firms EDP audit

Table 7. Results of T-test (Ratio of audit fees)

Use of technique	Ratio of audit fees	High firm(n=49)	Low firm(n=43)
Integrated test facility		mean: 3.85 t=-1.54 [*]	mean: 3.37
Parallel simulation		mean: 3.84 t= .10	mean: 3.87
Test data		mean: 4.44 t= -.38	mean: 4.31
Embedded audit module		mean: 3.32 t= .98	mean: 3.62
Generalized audit software		mean: 4.86 t=-1.37 [*]	mean: 4.37
Utility program		mean: 4.19 t= -.54	mean: 4.00

* : $P \leq 0.1$, ** : $P \leq 0.05$, *** : $P \leq 0.01$

Table 8. Results of T-test (Audit structure)

Audit structure Use of technique	Structured firm(n=52)		Unstructured firm(n=41)
Integrated test facility	mean: 3.85	t=-2.22***	mean: 3.05
Parallel simulation	mean: 3.95	t=-1.16*	mean: 3.50
Test data	mean: 4.50	t=-1.17*	mean: 4.05
Embedded audit module	mean: 3.55	t=-1.53*	mean: 3.00
Generalized audit software	mean: 4.68	t= .05	mean: 4.70
Utility program	mean: 4.29	t= -1.84**	mean: 3.55

* : $P \leq 0.1$, ** : $P \leq 0.05$, *** : $P \leq 0.01$

techniques are more utilized. This result proves the fact that structured firms are more likely to provide procedures or guidelines for the use of audit techniques, and these procedures increase the use of EDP audit techniques.

In Hypothesis 8, 9 and 10, which relate the firm specific factors to the use of EDP audit techniques, Hypothesis 8 was rejected, and Hypothesis 9 was partially and Hypothesis 10 was fully accepted.

To test Hypothesis 11, Mann-Whitney test was employed, and the results were presented in Table 9. The significant differences between International firms and Local firms were found in the use of integrated test facility, test

Table 9. Results of Mann-Whitney test (Type of audit firms)

Types of firms Techniques	International firms	Local firms
ITF	Mean rank 46.00 (78)	Mean rank 26.67 (9)
	U= 195.0***	
PS	44.85 (78)	36.61 (9)
	U= 284.5	
TD	45.17 (78)	33.89 (9)
	U= 260.0*	
EAM	46.01 (78)	26.56 (9)
	U= 194***	
GAS	44.89 (78)	36.28 (9)
	U= 281.5	
UP	45.64 (78)	29.78 (9)
	U= 223.0**	

* : $P \leq 0.1$, ** : $P \leq 0.05$, *** : $P \leq 0.01$

data, embedded audit module and utility program. The International firms' use of EDP audit techniques is far greater than that of Local firms.

In Korea, the International firms cooperate with the foreign Big Six firms. The foreign Big Six firms provide the elaborate audit guidelines, manuals and audit techniques to the International firms of Korea. Hence, the International firms are more apt to use the sophisticated EDP audit techniques and more structured audit techniques (i.e. International firms' mean rank of audit structure is 64.36 and Local firms' mean rank is 20.00, the difference is significant at the 0.0001 level). In this study, the Hypothesis 11, which suggests the difference between International firms and Local firms in the use of EDP audit techniques, was supported by the results.

6.3 The Relationships according to the Task Types of EDP Audit

To empirically investigate different impacts of influence factors on the use of techniques according to the task types of EDP audit, multiple regression analysis was used. Under each task type of EDP audit, multiple regression model was formulated as follows :

$$Y = a + b_1 \cdot X_1 + b_2 \cdot X_2 + b_3 \cdot X_3 + b_4 \cdot X_4 + b_5 \cdot X_5 + b_6 \cdot X_6 + b_7 \cdot X_7 + b_8 \cdot X_8 + b_9 \cdot X_9 + b_{10} \cdot X_{10} + b_{11} \cdot X_{11} + b_{12} \cdot X_{12} + b_{13} \cdot X_{13} + e$$

Where : Y = Perceived use of EDP audit technique under each task type,

b_i = ith regression coefficient,

X_i = ith influence factor.

In this regression equation, firm size, ratio of audit fees and audit structure that were classified into two groups, and type of audit firms were entered as a dummy variable. The results of multiple regression analysis under each task type are presented in Table 10 and 11. By comparing the results of the regression analysis between task types, different effects of influence factors can be shown. In Table 10, the results of embedded audit module, generalized audit software and utility program under each task type are presented.

Embedded audit module, generalized audit software and utility program are generally considered as the techniques for output verification. In Table 10, the effects of influence factors on the use of embedded audit module under the task of program verification were negative except for the technique effectiveness, and the F value was nonsignificant. However, under the task of output verification, certain effects on the use of embedded audit module were significant and positive. The effects of EDP audit experience, auditor's familiarity, effectiveness of the technique and audit structure were significant.

To evaluate the goodness of fit of the regression line under each task type,

Table 10. The results of multiple regression analysis

Task type Use of technique Influence factors	Program verification (N=84)			Output verification (N=82)		
	EAM	GAS	UP	EAM	GAS	UP
Education hours	.003	.010	.000	-.001	.011	.005
EDP courses	-.185	-.109	-.040	.097	.005	.039
Years of EDP audit experience	-.418*	-.064	-.175	.423*	.321	.103
Years of audit experience	-.044	-.084	-.018	.008	-.047	.058
Auditor age	.000	.077	-.042	-.042	.070	-.097*
Auditor's familiarity	.058	.022	.244*	.487**	.179*	.325***
The cost	.109	-.261*	-.118	.085	-.251*	-.200*
The skill required	-.139	-.145	-.247	-.093	-.048	-.141
The effectiveness	.350***	.461***	.342**	.348***	.401***	.497***
Firm size	-.289	.302	-.066	.128	.020	.232
Ratio of audit fees	-.099	.113	.448	.127	.137	.416
Audit structure	.718	.496	.779	.797*	.340	.343*
Type of audit firms	.036	-.528	-.570	-.123	-.266	.145
R ²	.20	.25	.21	.25	.27	.43
Standard error	1.384	1.529	1.493	1.296	1.272	1.220
F value	1.42	1.84**	1.45	1.78*	1.91**	3.94***
Residual sum of squares	136.1	166.8	158.9	116.0	112.0	103.4

. Number is regression coefficient.

* : $P \leq 0.1$, ** : $P \leq 0.05$, *** : $P \leq 0.01$

the R^2 and the standard error of the dependent variable were compared. In the embedded audit module, the R^2 of the program verification was smaller than that of the output verification, and the standard error of the program verification was greater than that of the output verification. Thus, it is assumed that the goodness of fit of the regression line in the output verification is better than the goodness of fit in the program verification.

However, whether the difference of the goodness of fit between task types was significant or not can not be decided from comparing R^2 or standard error. A better criterion for comparing the goodness of fit of the regression line is the residual sum of squares [3, 25]. Residual mean square (Residual sum of square/residual degree of freedom) of the program verification was divided by the residual mean square of the output verification, and the F ratio was calculated. The F ratio in the embedded audit module was 1.14, and it was not significant. Hence, the difference of the goodness of fit between task types was not statistically proved.

Under the task of program verification, the effects of the technique effectiveness and cost on the use of generalized audit software were significant. In the output verification, various influence factors, such as auditor's familiarity, cost and effectiveness, had a significant effect on the use of generalized audit software. From the values of the R^2 and the standard error, it is likely that the goodness of fit of the regression line in the output verification is higher than that of the program verification. To test the significance of difference, F ratio was computed. The calculated F ratio was 1.44, and it was significant at the 0.1 level. Hence, it is concluded that the relationships between the influence factors and the use of generalized audit software are different according to the task types.

In the utility program, the effects of auditor's familiarity and technique effectiveness were significant under the task of program verification. However, in the task of output verification, the impacts of auditor's familiarity and age, cost, technique effectiveness and audit structure were significant, and the F value was also significant at the 0.01 level. By comparing the R^2 and the standard error between task types, it is assumed that the regression line of the output verification is more fitted than that of the program verification. The calculated F ratio was 1.49 and it was significant at the 0.05 level. Hence, we conclude that the task types have a moderating effect on the relationships between the influence factors and the use of utility program.

Integrated test facility, parallel simulation and test data are used as the techniques for program verification. Table 11 shows the results of the regression analysis in intergrated test facility, parallel simulation and test data.

In the program verification, the effects of cost, skill required and effectiveness of the technique on the use of integrated test facility were significant. Under the task of output verification, the effect of the skill required was significant. However, the R^2 and the standard error were almost not different between task types. In the integrated test facility, the residual mean square of the output verification was divided by the residual mean square of the program verification. The calculated F ratio was 0.88, and it was not significant.

In the parallel simulation, skill required, effectiveness of the technique and firm size had a significant effect under the task of program verification. In the task of output verification, the effects of skill required and technique effectiveness on the use of parallel simulation were significant. However, comparing the R^2 and the standard error, the results were reverse. Thus, it is assumed that the goodness of fit of the regression line in the output verification is better than that of the program verification. The computed F ratio was 1.02, and it was nonsignificant.

Table 11. The results of multiple regression analysis

Task type Use of technique Influence factors	Program verification (N=84)			Output verification (N=82)		
	ITF	PS	TD	ITF	PS	TD
Education hours	.000	.001	.000	.000	.005	-.004
EDP courses	-.018	.058	.066	.182	.100	.089
Years of EDP audit experience	-.173	-.137	.334	-.215	-.019	.510*
Years of audit experience	-.044	-.041	-.039	.005	-.079	-.012
Auditor age	.019	.019	-.083	.027	.038	.010
Auditor's familiarity	.111	.037	.017	.028	.044	-.139
The cost	-.292*	.000	.121	.160	-.172	-.006
The skill required	-.363**	-.307**	-.399***	-.427**	-.359**	-.165
The effectiveness	.314*	.536***	.635***	.085	.627***	.666***
Firm size	-.045	.603*	.386	.172	.082	.003
Ratio of audit fees	-.088	-.555	-.231	-.262	.059	.267
Audit structure	.552	.218	.359*	.832	.674	.308
Type of audit firms	-.201	.382	-.099	.059	.074	.228
R ²	.15	.25	.35	.16	.28	.29
Standard error	1.582	1.557	1.394	1.488	1.578	1.444
F value	.97	1.82**	2.92***	1.0	2.10**	2.18**
Residual sum of squares	177.7	172.2	138.1	152.8	171.8	1.44.0

· Number is regression coefficient.

* : $P \leq 0.1$, ** : $P \leq 0.05$, *** : $P \leq 0.01$

When the test data is considered, the effects of skill required, audit structure and technique effectiveness in the program verification were significant. In the output verification, EDP audit experience and effectiveness of the technique had a significant effect on the use of test data. By comparing the values of the R² and the standard error between task types, it is suggested that in the test data, the regression line of the program verification is more fitted than that of the output verification. However, the calculated F ratio was 1.07, and it was not significant.

Based on the above findings, the Hypothesis 12, which proposes the moderating effects of the task types on the relationships between the influence factors and the use of techniques, was partially supported in this study.

7. CONCLUSION AND DISCUSSION

In this study, it was empirically proved that there are significant positive relations between the use of some EDP audit techniques and the influence factors, such as audit education, auditor's familiarity and effectiveness of the technique. The significant negative correlations among use of techniques, cost, skill required and auditor age were also empirically supported. The difference of the use of EDP audit techniques according to the conditions of firm specific factors was generally proved in the ratio of audit fees and the audit structure. The proposition that International firms make more use of EDP audit techniques than Local firms was partially accepted.

The moderating effects of the task types on the relations between the influence factors and the use of techniques were partially proved. It was found that the technique related factors have a greater influence on the use of test data under the task of program verification, and the effects of influence factors on the use of embedded audit module, generalized audit software and utility program are stronger in the output verification.

Based on the empirical results, this study suggests the technique and the auditor related implications for the successful attainment of audit objectives. First, the auditor's knowledge about audit tasks determines the level of audit performance, and the auditor's knowledge acquisition is influenced by the experience and the mental ability [23]. The audit experience is acquired from practical audit tasks, however, the auditor's mental ability can be increased with the audit education and training. In this study, the significant positive relations between the EDP audit education and the use of techniques suggest that the EDP or EDP audit education and training are absolutely needed for improving the auditor's ability to understand computer technology and apply the EDP audit techniques appropriately. The auditor's familiarity with the technique may be also enhanced through the EDP audit education. To increase the auditor's familiarity, on-the-job training is effective in addition to education.

The negative correlation between the auditor age and the use of EDP audit techniques verified the fact that aged auditors are unwilling to use the EDP audit techniques, since they are deficient in the ability about computer technology. Hence, the education and training programs for the aged auditors must be specially prepared. To increase the overall computer and EDP audit ability, the special education programs should include the basis of computer science, the application topics of computer technology and the EDP audit, etc.

The results of the technique related factors suggest that there are the necessities to develop new EDP audit techniques, which are low cost and easily

used. New audit techniques must be developed continuously because of the changing computer technology and growth in data communications. However, the audit techniques can be considered from the viewpoint of the audit efficiency. In achieving the audit objectives successfully, the EDP audit techniques which produce lower cost are preferred. If the cost to use the EDP audit technique is low and the technique is easily used, the auditors who are less proficient in the computer technology as well as the skillful auditors can use that EDP audit technique more actively, and the active use of technique may improve the level of audit performance.

The structured audit technology has many potential advantages. The advantages are better quality control of audit work, staff training, communications among auditors, and cost effectiveness [6]. The audit quality or performance is influenced by the use of adequate audit techniques. Thus, to increase the use of adequate EDP audit techniques, this study proposes that the audit firms must provide the concrete EDP audit guidelines, procedures and manuals, at it were, in EDP auditing tasks, the audit firms must choose the structured audit technology.

The moderating effects of the task types suggest various implications in the audit tasks and EDP audit techniques. The moderating effects of the task types on the relationships mean that there are proper EDP audit techniques according to the task types, and some influence factors have an effect on the selection or use of proper techniques under the specific EDP audit task.

The previous studies generally classified the EDP audit tasks as program verification and output verification. The EDP audit techniques were also grouped together into two broad categories; the techniques for verifying application program and the techniques for verifying outputs of processing [e.g. 10, 18, 24]. However, the EDP audit tasks can be classified into various types, such as application control validation, program validation and output verification. The application control validation can be subdivided into boundary control, input control, communication control and processing control validation, etc. From the results of this study, it is suggested that the EDP audit tasks must be classified more closely, and the proper EDP audit techniques according to the specific EDP audit task should be developed and provided. In performing EDP audit tasks, it is necessary to develop continuously the techniques suitable for the specific EDP audit task and educate the auditors in the new audit techniques.

The hypotheses in this study are only partially supported. It is thought that this partial support is due to the limitations of this study. The limitations and future reserch efforts are suggested as follws.

First, single questionnaire item was used to measure the auditor's use of

EDP audit techniques. So, the accuracy of measurement is somewhat questioned. For the future study, the accurate multi-items measure for the use of EDP audit techniques should be developed. Second, in this study, only two task types were considered. There are various task types of EDP audit. Task types must be theoretically subdivided, and the proper EDP audit techniques can be matched to the specific EDP audit task.

Third, there are other influence factors, such as auditor tenure, industry expertise, professionalism, and size and financial health of the client, etc. This study considered eleven influence factors. Other influence factors need to be examined in future studies. Fourth, in this study, as a quasi-experimentation the perceived use of EDP audit techniques was measured since the external auditors in Korean accounting firms make little use of EDP audit techniques. This perceived use may not correctly reflect the actual use. These are limitations of this study.

Finally, the intervening effect of the use of audit techniques on the relationships between the influence factors and the audit quality was not empirically tested. Some studies suggested the conceptual relationships among influence factors, use of audit techniques and audit quality. Future research may empirically examine the effect of influence factors on the audit quality through the use of EDP audit techniques.

REFERENCES

- [1] Abdel-khalik, A.R., D. Snowball & J.H. Wragge, "The Effects of Certain Internal Audit Variables on the Planning of External Audit Programs", *The Accounting Review*, Vol. LVIII, No. 2, April (1983), 215-227.
- [2] Abdolmohammadi, M. & A. Wright, "An Examination of the effects of Experience and Task Complexity on Audit Judgment", *The Accounting Review*, Vol. LXII, No. 1, January (1987), 1-13.
- [3] Achen, C.H. *Interpreting and using regression*, A SAGE University Paper, SAGE Publication, Inc., 1982.
- [4] Amer, T., A.D. Bailey & Prabuddha De, "A Review of the Computer Information Systems Research related to Accounting and Auditing", *Journal of Information Systems*, Fall (1987), 3-28.
- [5] Ashton, A.H., "Experience and Error Frequency Knowledge as Potential Determinants of Audit Expertise", *The Accounting Review*, Vol. 66, No. 2, April (1991), 218-239.
- [6] Bamber, E.D., D. Snowball & R.M. Tubbs, "Audit Structure and Its Relation to Role Conflict and Role Ambiguity: An Empirical Investigation", *The Accounting Review*, April (1989), 285-299.

- [7] Bamber, E.D. & D. Snowball, "An experimental Study of the Effects of Audit Structure in Uncertain Task Environments", *The Accounting Review*, July (1988), 490-504.
- [8] Bonner, S.E., "Experience Effects in Auditing: The Role of Task-specific Knowledge", *The Accounting review*, Vol. 65, No. 1, January (1990), 72-92.
- [9] Bonner, S.E., "A Model of the Effects of Audit Task Complexity", *Accounting, Organization and Society*, Vol. 19, No. 3 (1994), 213-234.
- [10] Cash, J.I., Bailey, A.D. & Whinston A.B., "A Survey of Techniques for Auditing EDP-based Accounting Information Systems", *The Accounting Review*, October (1977), 813-832.
- [11] Carcello, J.V., R.H. Hermanson & N.T. McGrath, "Audit Quality Attributes: The Perceptions of Audit Partners, Prepares, and Financial Statement Users", *Auditing: A Journal of Practice & Theory*, Vol. 11, No. 1, Spring (1992), 1-15.
- [12] Choo, F. & K.T. Trotman, "The Relationship between Knowledge Structure and Judgment for Experienced and Inexperienced Auditors", *The Accounting Review*, Vol. 66, No. 3, July (1991), 464-485.
- [13] Cushing, B.E., "Discussion of the association between Audit Technology and Audit Delay", *Auditing: A Journal of Practice & Theory*, (Supplement, 1989), 38-47.
- [14] Cushing, B.E. & J.K. Loebbecke, Studies in Accounting Research NO. 26, Comparison of Audit Methodologies of large Accounting Firms, *American Accounting Association*, 1986.
- [15] DeAngelo, L.E., "Auditors Size and Audit Quality", *Journal of Accounting and Economics* (1981), 186-199.
- [16] Deis, D.R. & G.A. Giroux, "Determinants of Audit Quality in the Public Sector", *The Accounting Review*, July (1992), 462-479.
- [17] Francis, J.R., "The Effect of Audit Firm Size on Audit Prices: A Study of the Australian Market", *Journal of Accounting and Economics* (1984), 133-151.
- [18] Garsombke, H.P. & R.M. Tabor, "Factors explaining the Use of EDP Audit Techniques", *Journal of Information Systems*, Fall (1986), 48-66.
- [19] Johnson, P.E., K. Jamal & R.G. Berryman, "Audit Judgment Research", *Accounting, Organization and Society*, Vol. 14, No. 1/2 (1989), 83-99.
- [20] Knapp, M.C., "Factors that Audit Committee Members Use as Surrogates for Audit Quality", *Auditing: A Journal of Practice & Theory*, Vol. 10, No. 1, Spring (1991), 35-52.
- [21] Kinney, W.R., "Audit Technology and Preferences for Auditing Standards", *Journal of Accounting and Economics* (1986), 73-89.

- [22] Kurtpany, S.M. & P.M.J. Reckers, "An Examination of the Influence of CPA Firm Type, Size and MAS Provision on Loan Officer Decision and Perceptions" , *Journal of Accounting Research*, Vol. 23, NO. 2, Autumn (1985), 885-896.
- [23] Libby, R. & H.T. Tan, "Modeling the Determinants of Audit Expertise" , *Accounting, Organization and Society*, Vol. 19, No. 8 (1994), 701-716.
- [24] Lovata, L.M., "Audit Technology and the Use of Computer assisted Audit Techniques" , *Journal of Information Systems*, Spring (1990), 60-68.
- [25] Montgomery, D.C., L.A. Johnson & J.S. Gardiner, *Forecasting & Time Series Analysis*, McGraw-Hill, Second Edition, New York, 1990.
- [26] Morris. M.H. & W.D. Nichols, "Consistency Exceptions: Materiality Judgment and Audit Firm Structure" , *The Accounting Review*, Vol. LXIII, No. 2, April (1988), 237-254.
- [27] Nunally, J., *Psychometric Theory*, McGraw-Hill, New York, 1978.
- [28] Palmrose, Z.v., "Audit Fees and Auditor Size: Futher Evidence" , *Journal of Accounting Research*, Spring (1986), 97-110.
- [29] Palmrose, Z.V., "An analysis of Auditor Litigation and Audit Service Quality" , *The Accounting Review*, January (1988), 55-73.
- [30] Pierre, K.S. & J.A. Anderson, "An Analysis of the Factors associated with Lawsuits against Public Accountants" , *The Accounting Review*, Vol. LIX, No. 2, April (1984), 242-263.
- [31] Pratt, J. & P. Beaulieu, "Organizational Culture in Public Accounting: Size, Technology, Rank and Functional Area" , *Accounting, Organization and Society*, Vol. 17, No. 7 (1992), 667-684.
- [32] Schultz, J.J. & Gustavson, S.G., "Actuaries' Perceptions of Variables affecting the Independent Auditor's Legal Liability" , *The Accounting Review*, Vol. LIII, No. 3, July (1978), 626-641.
- [33] Shockley, R.A., "Perceptions of Auditor's Independence: An Empirical Analysis" , *The Accounting Review*, Vol. LVI, No. 4, October (1981), 785-800.
- [34] Stice, J.D., "Using Financial and Market Information to Identify Pre-engagement Factors associated with Lawsuits against Auditors" , *The Accounting Review*, Vol. 66, No. 3 July (1991), 516-533.
- [35] Weber, R., *EDP Auditing*, McGraw-Hill, Second Edition, New York, 1988.
- [36] Weiss, I.R., "Auditability of Software: A Survey of Techniques and Costs" , *MIS Quarterly*, December (1980), 39-50.
- [37] Williams, D.D. & M.W. Dirsmith, "The Effects of Audit Technology on Auditor Efficiency: Auditing and the Timeliness of Client Earnings Announcements" , *Accounting, Organization and Society*, Vol. 13, No. 5 (1988), 487-508.