

SYSTEMS INTEGRATION, MANAGEMENT INVOLVEMENT AND QUALITY OF INTERNAL CONTROLS AND AUDITING

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ABSTRACT

Enterprise resource planning (ERP) systems are implemented to integrate internal corporate information systems. One of the benefits of ERP implementation to firms is the easy maintenance of their internal control systems. The 2013 Committee of Sponsoring Organizations framework notes that management has the responsibility and authority to build systems for achieving its internal control goals. Therefore, this study simultaneously analyzes the association between information integration and internal controls effectiveness and the relationship between management involvement and internal controls effectiveness, as well as the relationship between management involvement and audit quality. Results show that information system integration and management involvement have positive impacts on internal control effectiveness and that management involvement affects audit quality both indirectly and directly.

Keywords: enterprise resource planning systems, Committee of Sponsoring Organizations framework, system integration, management involvement, quality of internal controls, auditing quality

INTRODUCTION

Enterprise resource planning (ERP) systems are implemented to integrate internal corporate information systems, as they are defined as integrated information and information-based processes within and across functional

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areas in an organization (Kumar and Hillegersberg, 2000). A benefit to firms that has been attributed to the ERP implementation is the easy maintenance of internal controls (Matsuo, 2009; Nikkei Solution Business, 2009). ERP systems help firms set up accurate and timely information flow systems for internal managers and outside stakeholders and make information transparent (Zhang and Wang, 2010; pp. 33-34), as ERP systems are designed for the processing of business transactions built upon a core database management system (Kuhn and Sutton, 2010; p. 92). Therefore, firms with ERP implementation can guarantee accurate and timely information disclosure and improve corporate governance by resolving information asymmetry problems (Zhang and Wang, 2010; p. 34). Based on previous evidence, the effectiveness of an internal control system is likely to increase when corporate governance is improved. Therefore, the effectiveness of internal controls is essential for audit quality improvement and is characterized by the decrease in misstatements and errors in preparing financial statements.

Although previous studies have examined the relationship between system integration and internal control quality, the association between system integration and management involvement, and the relationship between system integration and auditing quality separately, few studies have investigated these relationships simultaneously. Moreover, although Kuhn and Sutton (2010) suggested the possibility of ERP implementation changing the architectures for continuous auditing, whether ERP implementation has met the expectations is not yet clear. Therefore, this study simultaneously analyzes the association between information integration and internal controls effectiveness, the relationship between management involvement and internal controls effectiveness, and the relationship between management involvement and audit quality. Our results show that information system integration and management involvement have positive impacts on internal control effectiveness and that management involvement affects audit quality both indirectly and directly. This study validates the relationship between ERP implementation and effectiveness of internal controls and the association between ERP implementation and auditing quality.

This study makes three contributions to the literature. First, we provide the relationship between the implementation of accounting information and internal control systems using the results of the survey, whereas Chen, Smith, Cao, and Xia (2014) examined the association using archived data.

Demands for stronger internal corporate controls grew in Japan because of the Kanebo scandal¹ and the Enron scandal in the United States. These accounting scandals led to the implementation of internal controls systems in both the United States and Japan and the need for public firms to disclose internal control deficiencies they find in their internal control processes. Limitations to the possibility of examining the quality of internal controls based on publicly available information alone exist because only a few firms in Japan report deficiencies in their internal control reports. Several studies utilized public firm information in Japan to examine the internal control deficiencies and subsequent response of capital markets (Kawanishi and Takeda, 2010; Yazawa, 2010; Nishizaki and Takeda, 2014).² Kawanishi and Takeda (2010), Yazawa (2010), and Nishizaki, and Takeda (2014) examined the internal control systems using publicly available information. Examining the quality of the internal control systems of normal firms that do not disclose their deficiencies is important. Analyzing their internal control systems by using questionnaire results is an appropriate means to validate the quality of internal control systems. Determining the level of management involvement from publicly available information is also difficult. Therefore, the study using survey results to obtain internal information is of significant value, although it is considered subjective.

Second, using survey results is beneficial to measuring the levels of systems integration. Several studies have examined publicly available information, such as Morris (2011) who regarded the implementation of ERP systems as systems integration. However, determining whether the systems are truly integrated when only certain portions of ERP packages have been implemented is difficult. Third, even given the implementation of software packages, whether firms actually use these packages in an integrated manner is a separate matter. Therefore, this study, which measures the level of integration of information systems using survey responses, can capture the actual state of firms' information system integration. Fourth, this study focuses on the effectiveness of system integration for internal

1 See Numata and Takeda (2010) and Skinner and Srinivasan (2012) for more information on the scandals.

2 Kawanishi and Takeda (2010) and Yazawa (2010) find no stock price reaction to the disclosure of internal control weaknesses, suggesting no information value for the market in this disclosure. Nishizaki and Takeda (2014) find a negative stock market reaction to the disclosure of internal control weaknesses.

controls, whereas Mahlendorf (2014) documented the effectiveness of system integration for their financial framework.

The remainder of this study proceeds as follows. Previous studies are discussed in Section 2. Hypotheses are developed in Section 3. The model and variables, which are the bases of this study, are explained in Section 4. The results of our model and the interpretation are presented in Section 5. The conclusions and the limitations of our research are provided in Section 6.

LITERATURE REVIEW

Continuous auditing in the ERP system, which includes embedded audit modules and a monitoring control layer (MCL), is becoming a significant portion of corporate governance (Kuhn and Sutton, 2010: p. 92). The MCL architecture may help provide continuous monitoring and control of accounting information systems (Debreceeny, Gray, Ng, Lee and Yau, 2005) because it is an external software module that operates independently of the information system (Kuhn and Sutton, 2010: p. 91). An ERP system is supposed to improve a firm's internal information environment by increasing the transparency of operations across business units (Dorantes, Chan, Gary and Richardson, 2013).

A few studies have investigated the effect of an ERP system on a firm's information environment, such as its internal control quality, management involvement, and auditing quality (Dorantes, Chan, Gary and Richardson, 2013; Mahlendorf, 2014). Dorantes, Chan, Gary, and Richardson (2013) found that ERP implementation improves managers' information environment by comparing the management forecast qualities in ERP-implementing firms with non-ERP-implementing firms. Mahlendorf (2014) suggested that system integration not only increases the financial framework's function but also makes the internal controls and risk management, as well as the performance evaluation functions, interact with each other to improve financial framework effectiveness. Morris (2011) documented that ERP systems, which use built-in controls that mirror firms' infrastructures, help firms improve their internal control by providing evidence that ERP-implementing firms are less likely to report internal control deficiencies than non-ERP-implementing firms.

The 2013 Committee of Sponsoring Organizations (COSO) framework and the Japanese standard of internal control indicate that management has the responsibility and authority to build systems for achieving internal control goals (COSO 2013; BAC 20073). The Information Systems Audit and Control Association (ISACA) engages in the development, adoption, and use of globally accepted, industry-leading knowledge and practices for information systems. The ISACA released COBIT 5, which designates that management is important in the development of information systems.⁴

HYPOTHESIS DEVELOPMENT

ERP Integration and Internal Controls

The relationship between the ERP system implementation and the internal control system has mixed results. Morris (2011) found that ERP-implementing firms are less likely to report internal control deficiencies than non ERP-implementing firms by assessing the sample firms from 1994 to 2003. This finding suggests that ERP systems help to improve the quality of internal controls and decrease earnings management. However, Brazel and Dang (2008) found a positive relationship between the extent of ERP implementation and earnings management. Dorantes et al. (2012) provided evidence that a positive effect of ERP is the improved internal control information that management uses to form earnings forecasts.

Studies have been conducted on the relationship between the extent of information development and internal control systems (Klamm and Watson, 2009; Morris, 2011). Klamm and Watson (2009) examined whether control environments, risk assessment, and control activities are inter-related and found an association among control environments, risk assessment, and control activities. The study subsequently classified the material weaknesses in internal controls into IT- and non-IT-related weaknesses. As a result, it

3 Council Opinion, the so-called Japanese standard of internal control, added IT control as one of the basic components of internal control because of the consideration of the current situation of the dissemination of IT into business organizations along with the rapid development of the IT environment (BAC 2007).

4 Information Systems Audit and Control Association (ISACA). 2012. *A Business Framework for the Governance and Management*. They indicate that the COBIT 5 framework is built on five basic principles and includes extensive guidelines for the governance and management of enterprise IT. <http://www.isaca.org/cobit/pages/default.aspx>

provided evidence that firms with IT-related deficiencies have more serious weaknesses than firms with non-IT-related deficiencies. Morris (2011) examined the percentage of firms that implemented ERP among all the firms with material weaknesses in their internal controls and found that those that introduced ERP systems had lower probabilities of having material weaknesses in their internal controls at both company and accounting levels. Both studies were conducted on the basis of publicly available information. Zhang and Wong (2010) argued that ERP-implementing firms show patterns of corporate governance that are different from those of non-ERP-implementing firms.

By contrast, several studies have suggested that ERP implementation reduces internal control effectiveness. In a survey-based study, Wright and Wright (2002) suggested that ERP implementation increases the potential for control weaknesses and results in financial statement errors and inaccurate internal information. Brazel and Dang (2008) provided evidence that ERP systems increase manager access to accounting data and decrease control quality by examining earnings management.

The current study analyzes employee responses to questionnaires regarding the level of information system integration, internal controls assessment and audit quality.⁵ This study first examines whether the integration of information systems increases satisfaction with the systems and heightens the effectiveness for internal controls. Matsuo (2009) and Nikkei Solution Business (2009) noted that implementing ERP packages could easily monitor the internal control system. If their assertion is correct, then integrating information systems should improve the satisfaction of these

5 Details on this survey are given in Nakashima and Okuda (2013). The survey entitled “internal controls and IT” was implemented in September 2012 to understand the current status of accounting information systems, including awareness of internal controls for Japanese firms in the post of the Japanese version of the Sarbanes-Oxley Act (“J-SOX”). The subjects of the survey were public firms in Japan (those from Sections 1 and 2 of the Tokyo Stock Exchange, Sections 1 and 2 of the Osaka Stock Exchange, the Nagoya Stock Exchange, the Fukuoka Stock Exchange, and JASDAQ). The questionnaire (see APPENDIX) was sent to the office of the president of 3,605 companies on September 1, 2012 with a requested return date of September 28. A total of 212 effective responses were received, and the response rate was 6%. The questions on this survey were regarding 1) management attitudes, 2) strengthening of internal controls and governance, 3) audits, 4) the environment around financial accounting systems, 5) the organization around financial accounting systems, 6) characteristics of financial accounting systems, and 7) results from financial accounting systems.

information systems and the effectiveness of internal controls. Therefore, the following hypothesis is developed:

H1: A positive association exists between information integration and internal control effectiveness.

Management Involvement and Internal Controls

Variables that influence the effectiveness of internal controls are not limited to the development of information systems. Management involvement is also a determinant of the quality of internal controls. Managers are responsible for and have authority over internal control systems. The 2013 COSO framework states that management has the responsibility and authority to build systems to achieve the goals of internal controls. The extent of whether managers' perception of their internal controls affects the effectiveness of their internal controls is predicted.

However, how much the management recognition of its responsibility for and authority over the internal control system depends on the effectiveness of internal control systems is not clear in practice. Suda, Nakashima, Sasaki and Okuda (2011a; 2011b) suggested that the more positive managers' attitudes are, the higher the effectiveness of their internal controls. Nakashima and Ziebart (2015) documented the association between the tone at the top and the effectiveness of internal control systems by indicating that the tone at the top is significantly associated with the effectiveness of operations, efficiency of operations, enforcement of law compliance, and promotion of property preservation. This finding is not unexpected because the tone at the top is related to the effectiveness of the internal controls system. Therefore, the following hypothesis is proposed:

H2: A positive relationship exists between management involvement and information effectiveness.

Determinants of Audit Quality

Generally, the accepted definition of audit quality in the literature is the probability that the auditor will both discover and report a breach in the client's accounting system (DeAngelo, 1981). According to Mountford, the

chief financial officer of the New Zealand Rugby Union, audit quality relates to whether users' perception of the credibility of the financial statements has increased because of the audit (Murray, 2013).

Many researchers have investigated the determinants of audit quality. Suyono (2012) documented that the independence of auditors and their accountability, which she defined as a social psychological motive for responsible actions and decisions for the environment, affect audit quality. Enofe, Mabame, Aderin and Ehi-Oshio (2013) suggested that audit firm size, board independence, and ownership structure are positively associated with audit quality. Al-Khaddsh, Al-Nawas and Ramadan (2013) found that a positive and significant correlation exists among audit quality and audit efficiency, reputation of audit office, auditing fees, size of audit firm, and proficiency of audit.

However, few studies have been conducted on the relationship between internal control quality and audit quality and the association between management involvement and audit quality simultaneously. Murray (2013) argued that how much interaction the management and auditors have affects audit quality, as auditors with the ability to benchmark against other clients in similar industries are the most insightful. Therefore, Murray (2013) concluded that creating an environment where all staff members embrace a constructive relationship with the auditors with a high level of integrity is the management's responsibility. However, Murray (2013) warned that auditors with professional skepticism and objectivity, which are demonstrated by being prepared to challenge the reliability of information, i.e., maintain independence, are significant in audit quality.

The possibility that managers perceive audit quality exists when managers are actively engaged in developing their internal control systems. Based on this finding, this study conducts an analysis that considers the fact that management involvement likely influences the quality of audits directly and positively. The following hypotheses are developed:

H3 (a): A positive relationship exists between internal controls' effectiveness and audit quality.

H3 (b): A positive relationship exists between management involvement and audit quality.

VALIDATION MODEL

This study uses a covariance structure analysis to validate relationships. In other words, we treat the five areas of information system integration, information system satisfaction, effectiveness of internal controls, management involvement, audit quality as latent variables, and assume associations among them. Figures 1 and 2 show these relationships.

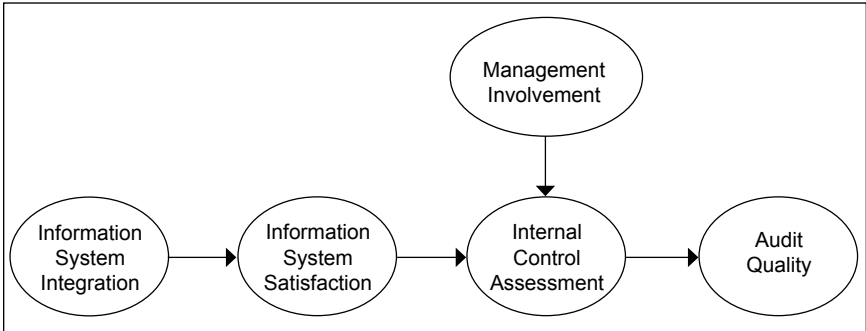


Figure 1: Model 1

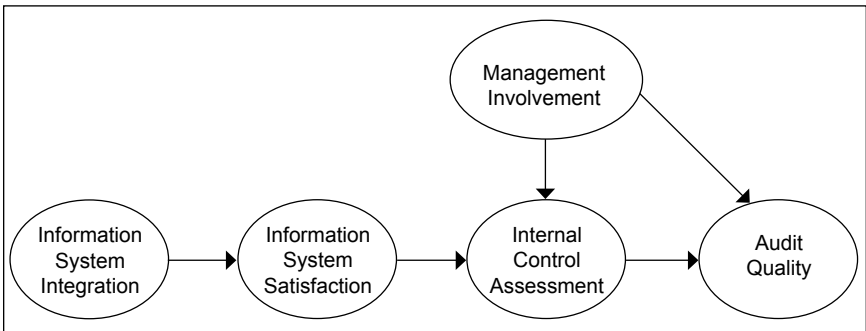


Figure 2: Model 2

The latent variables cannot be observed, although observing the variables that are related to these latent variables is possible. We call them observable variables and measure them in this study through our survey.

This study first focuses on the level of information system integration. It measures the level of information system integration by posing a question on the extent of the integration of various information systems

with financial accounting information systems. Specifically, we inquire about: 1) managerial accounting systems, 2) sales information systems, 3) purchasing information systems, 4) inventory management systems, 5) production information systems, and 6) fixed asset management systems. We assign six variables to the responses, Q611 to Q616, corresponding to the number of each question.

This study assumes that system integration increases the benefits derived from accounting information systems. Therefore, satisfaction in the information systems themselves is a latent variable. Furthermore, this study considers satisfaction in the financial accounting system to be another latent variable. Inquiries on the following four areas are made: access to detailed information, access to updated information, ease of use of an accounting information system, and security as an accounting information system and information system satisfaction. In other words, we pose these questions because these variables can measure the extent of the features in information systems, which are required to satisfy users. These responses are assigned variable names Q711 to Q714.

As the practice of internal controls has penetrated Japan, we ask how effective the responses to the J-SOX regulations are regarding the following six areas: 1) improvement in corporate governance, 2) improvement in business effectiveness (achievement of goals), 3) improvement in business efficiencies (rational use of resources), 4) improvement in the reliability of financial reporting, 5) improving adherence to laws governing business activities, and 6) promoting asset preservation. The responses are assigned variable names of Q211 to Q216.

With regard to management involvement, we inquire about how positive the managers are about the following: 1) compliance with J-SOX regulations and 2) improvement of internal controls. The responses are assigned variable names of Q111 and Q112. We also ask questions about: 1) the quality of financial statement audits and 2) the quality of internal control audits. The responses to these questions are assigned variable names of Q31 and Q32.

The survey was sent to 3,605 public firms in Japan. We received 223 valid responses and obtained a response rate of 6.18%. The questions

provided in the survey are listed in Appendix 1. The responses follow a seven-point Likert scale. Portions of the responses are used in this study. The basic statistics of the variables used in our study are shown in Table 1.

Table 1: Basic Statistical Values

Variable	Measurement	Average	Standard Deviation
Q111	223	5.59	1.20
Q112	223	5.67	1.05
Q222	223	4.40	1.35
Q223	223	4.34	1.30
Q224	223	5.55	1.15
Q225	223	5.29	1.20
Q226	223	4.78	1.30
Q31	222	5.22	1.14
Q32	222	4.99	1.19
Q611	211	4.97	1.68
Q612	204	4.84	1.74
Q613	194	4.86	1.80
Q614	190	4.58	1.88
Q615	165	4.22	1.88
Q616	210	4.95	1.84
Q711	221	5.04	1.13
Q712	221	4.65	1.26
Q713	222	4.52	1.17
Q714	223	5.01	1.26

RESULTS

The results of our validation using Model 1 are shown in Figure 3 and those using Model 2 are shown in Figure 4.⁶ The RMSEA shows that the applicability of the overall model is 0.087 for Model 1 and 0.083 for Model 2. CFI is neither good nor bad for both models, with Model 1 at 0.911 and Model 2 at 0.919. The relationship between our latent variables and the observable variables is statistically significant at the 1% level across all variables in both models. We can interpret this finding to mean that the observable variables increase with the latent variables.

Test of H1

We next consider the relationships of our latent variables. With regard to the influence of information system integration on information system satisfaction, both have a positive relationship at 0.47 and are statistically significant at 1%. In other words, firms with integrated systems are satisfied with these systems. In both Models 1 and 2, the relationship between system satisfaction and internal control effectiveness is 0.19, which is statistically significant at the 5% level. Based on this finding, we can assume that increasing the information system satisfaction also increases the effectiveness of internal controls.

Test of H2

The relationship between management involvement and internal control effectiveness is statistically significant and positive at the 1% level. Furthermore, when comparing the magnitude of the relationship with the effectiveness of internal controls between information system satisfaction and management involvement, the association between management involvement and information effectiveness is more than twice the size of the association between information system satisfaction and internal control effectiveness. Based on this finding, management involvement exerts a tremendous influence on the effectiveness of internal controls.

6 Among the values near the arrows, the upper values are estimated values of direct effects, and those in the lower brackets are z-values. As regards the upper number, *** signifies a significance level of 1%, and ** signifies a significance level of 5%. To keep the figure from becoming too intricate, the descriptions of disturbance terms are abbreviated.

Test of H3 (a) and H3 (b)

Finally, the relationship between internal control effectiveness and audits is statistically significant and positive at least at the 5% level in both models. However, in Model 2, where we posit a direct relationship between management involvement and audit quality, the value is smaller and thus the relationship between management involvement and audit quality is statistically significant and positive at the 1% level. Based on this finding, we suggest that management involvement increases audit quality through internal controls directly and indirectly.

We do not show a direct effect of information system integration on internal control effectiveness or audit quality in these figures, as another observation variable is interposed. Moreover, as two routes are available for management involvement to influence audit quality in Model 2, we do not show the results that consider the influence of both routes. Table 2 shows the results of their influences. Systems integration in both models increases the effectiveness of internal controls. Furthermore, the impact of systems integration on audit quality is observed in Model 1 and is statistically significant, although the value (0.04) is small. However, in Model 2, information integration is not associated with audit quality (0.02) and is statistically insignificant. Based on this finding, information system integration has a limited effect on audit quality.

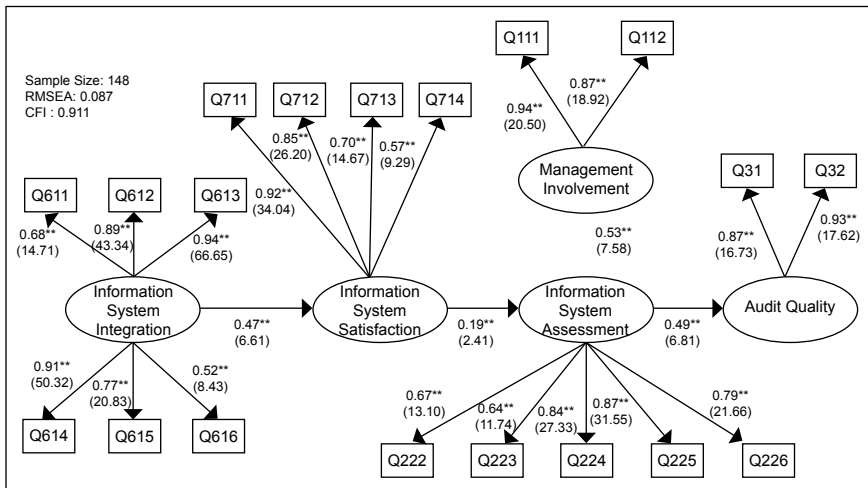


Figure 3: Results of Model 1

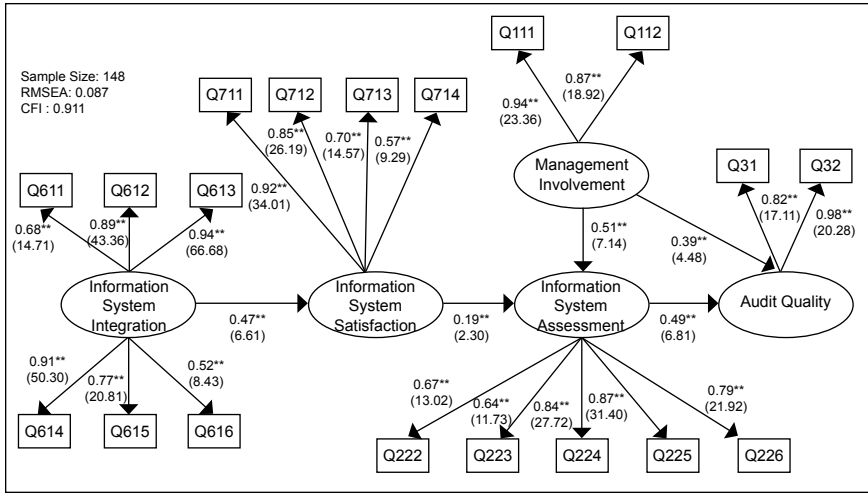


Figure 4: Results of Model 2

Table 2: Direct Effects Among Latent Variables

			Dependent Variables			
			Internal Controls Effectiveness	Z-Value	Audit Quality	Z-Value
Explanatory Variables	Model 1	Systems integration	0.07	2.14	0.04	2.02
		System Satisfaction			0.09	2.32
		Management Involvement			0.22	4.03
	Model 2	Systems integration	0.07	2.06	0.02	1.53
		System Satisfaction			0.04	2.22
		Management Involvement			0.44	5.25

We statistically confirm that system satisfaction increases audit quality in both models. We also statistically confirm the influence of management involvement on audit quality. However, when comparing these two, the influence of management involvement on audit quality is greater. When

we compare the effect on auditing quality between systems integration and management involvement, the influence of management involvement on audit quality is greater. Based on this finding, management involvement increases both the quality of internal controls and the auditing quality.

CONCLUSIONS AND FUTURE RESEARCH

In this study, we examined the relationships between information system integration, internal controls effectiveness, and audit quality. We suggested the following. First, by integrating information systems, firms improve satisfaction with those information systems, which results in a higher effectiveness of internal controls. Second, management involvement in developing the internal controls increases the effectiveness of the internal controls, and we found that the influence of management involvement on the effectiveness of internal controls is greater than the influence of internal control satisfaction on the effectiveness of internal controls. We validated the effectiveness of internal controls on improving audit quality. Our results show that management involvement also directly improves audit quality. Although we observed that system development improves audit quality to a certain extent, the effect of management involvement is greater.

This study has some limitations. First, the study provided survey-based evidence. As the survey was the only approach adopted to validate the association among system integration, management involvement, and audit quality simultaneously because of limited available public information, a lack of objectivity on the audit quality could be detected through sample bias. Second, this study did not examine whether ERP implementation affects financial reporting quality. In future works, studies on the association between ERP implementation and financial reporting quality should be conducted. Third, this study completely relied on the survey in its analysis.⁷ Future studies should further validate whether relationships can be observed between the variables using archived data and the variables measured in this survey.

⁷ Suda et al. (2011a; 2011b) suggest that auditors proactively provide services other than audits for firms that noted high audit quality in their responses. This suggests the possibility that the firms evaluate audit quality favorably when it is convenient the firms to do so.

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APPENDIX 1

Questionnaire (responses are given according to a seven-point scale)

Management involvement: the tone at the top

How does your firm's top management or CEOs feel about documenting internal controls or evaluating effectiveness? (not very proactive–extremely proactive)

1. Compliance with J-SOX provisions
2. Improvement of internal controls

Improvement of internal controls and governance

J-SOX laws are expected to be effective in implementing corporate governance. How effective does your firm consider J-SOX laws will be as regards the following? (completely ineffective–extremely effective)

1. Improving overall corporate governance
2. Increasing business effectiveness (achieving goals)
3. Improving business efficiency (rational use of resources)
4. Improving reliability of financial reporting
5. Improving adherence to laws on business activities
6. Promoting the safeguarding of assets

Financial accounting system environment

How important are the following items when designing information systems related to financial accounting? (“financial accounting systems” below) (do not take into account–take into account a great deal)

1. Dealing with accounting related systems
2. Efficiency of financial reporting
3. Dealing with vulnerability and flexibility in information systems
4. Integration with business strategies and business processes

Organization for the financial accounting system

How influential are the top management and the heads of each division on the implementation and design of the financial accounting system? (completely uninvolved–extremely influential)

1. Top management
2. Head of each division

How much do you use the following IT tools? (do not use at all–use a lot)

1. Spreadsheet software (e.g. Excel)
2. Spreadsheet with macros
3. Databases that enable more advanced data manipulation than Excel
4. Statistical data-mining methods for the analysis of financial information

Characteristics of financial accounting system

How integrated are the following information systems with the financial accounting system? (Completely uninterested–completely integrated)

1. Management accounting system
2. Sales information system
3. Purchasing information system
4. Inventory management system
5. Production information system
6. Fixed asset management system

Benefits of financial accounting system

How satisfied are you with the following? (not at all satisfied–extremely satisfied)

1. Access to detailed information
2. Access to updated information
3. Ease of use of the accounting information system
4. Security of the accounting information system