

Fast Close: A Case of Financial Close Process Automation*

by Dae-Hyun Kwon**, Tae-Sik Ahn***, Iny Hwang****, and Jin-Ha Park*****

Closing the book for the recent accounting period and issuing financial statements is one of the most common challenges for companies. This study examines a case of an automated financial close process and discusses issues related to its implementation. First, the study introduces the closing process of a case company including the purpose, improvement plan, and designing process. Second, the study discusses the impacts of the newly adopted system. Specifically, it reveals that under the new plan, close process automation has been maximized. It also shows that raw data validation has been improved so that past data errors can be categorized by their types and removed before the closing process begins. The order of the process has also been redefined saving closing time. Third and finally, difficulties and considerations for successful use of the system have been discussed. This study aims to provide useful information to companies which consider implementing more organized closing systems. We expect that this study will be helpful to small and medium enterprises which suffer from delayed closing but have little experience with automated BPM system.

Keywords : *Closing Process, Close Process Automation, Accounting Information System*

* This research is partly supported by the Institute of Management Research, Seoul National University. We also wish to thank to the case company which provided valuable data.

** First-Author, Professor, Division of Business Administration, Sookmyung Women's University (e-mail: kdh98871@sm.ac.kr)

*** Co-Author, Professor, Business School, Seoul National University (e-mail: ahnts@snu.ac.kr)

**** Co-Author, Professor, Business School, Seoul National University (e-mail: hiny72@snu.ac.kr)

***** Corresponding Author, Professor, Department of Accounting, Soongsil University (e-mail: parkjh04@ssu.ac.kr)

I. Introduction

A firm records accounting information about its operations and provides this information to its users to help them make decisions. Therefore, a firm's accounting system is designed to serve this purpose. The accounting system collects data from all areas of operations such as R&D, purchasing, production, and sales, then calculates costs under reasonable standards, and finally produces and provides financial information. The closing process procedure should go through entry of information, closing receipts and disbursements, cost calculation, and adjustments. It is important but challenging in practice to conduct this process quickly and accurately (Bragg, 2009). Literature that mainly focuses on the closing system itself is sparse, but audit research implies that fast closing is critical issue for companies. For example, Hammersley, Myers, and Shakespeare (2008) categorize problems with financial statement closing procedures as financial reporting weakness. Ettredge, Li, and Sun (2006) propose that companies with control problems in closing process experience longer audit delays. As such avoiding delays and improving closing procedure up to date is a critical issue.

In this study, a company (hereafter referred to simply as "The Company") has introduced automation to improve its closing process. As such the closing process is conducted automatically based on predefined procedures and activities, and the ongoing process can be updated in real time so that managers can analyze and handle any issues that may occur.

We cover the purpose, improvement plan, designing process, impacts, and further improvements plan of the closing system automation. In detail, we describe the activities under the automated closing system, and closing processes that follow Key Risk Index (KRI). Then, we will review related issues and their outcomes, and also investigate how speed, quality, and control of the closing process were improved with the implementation of closing system automation.

We expect that this study will provide useful guidance for companies which are willing to improve their cost accounting systems to provide effective and timely information for decision making. More importantly, we would like to contribute to the literature by emphasizing the importance of closing process. Anecdotal evidence of a company shows that error in the closing process regarding the calculation of COGS versus inventory results in overstatement of inventory, and consequently earnings. It was due to inappropriate manual classification of some expenses. Financial close process automation can alleviate both unintentional errors and intentional errors and improve financial reporting quality. Literature shows that poor earnings quality is related to higher cost of capital (Francis, LaFond, Olsson, and Schipper, 2004). Negative price reactions to restatement announcements (Palmrose and Scholz, 2004) also reveals that earnings quality is important. In this regard, we believe that firms can benefit from the improvement in closing process procedure. This study proceeds as follows. Section 2 describes demands for improved closing system and the improvement plan. Section 3 presents the design of the closing process. Section 4 discusses both the impact and limitation of the new system. Finally, section 5 provides conclusions.

II. Demands for an Improved Closing System and the Improvement Plan

2.1 Demands for an Improved Closing System

The American Accounting Association (AAA) defines accounting as "the process of identifying, measuring and communicating economic information to permit informed judgments and decisions by users of the information." That is, an Accounting Information System (AIS) refers to this process and includes the following activities; a firm

conducting economic activities, the accounting manager of the firm measuring and recording these activities, a firm producing and providing its financial statements, and information users using these statements to make decisions. In the middle of this AIS process, the closing process includes the measurement and recording of financial information, and the production and provision of financial statements.

For The Company, the closing process is defined as a sequence of data transactions, closing, reporting, and analysis. With the early adoption of the Enterprise Resources Planning (ERP) system, 82 percent of the process has been already conducted using on-line or automated systems. In other words only 18% of the process was conducted manually using Microsoft Excel or calculators.

However, as the existing closing process was focused on the final step of closing, so the handling of the errors from the initial data transaction was limited. In addition, there existed unnecessary tasks due to off-line manual works. Therefore, to maximize process efficiency and strengthen core competency as a business partner who provides useful information, The Company implemented closing system automation and extended the closing process's managing area into data transaction. This automated closing system collects and reports accounting information based on pre-defined policy, logic,

and process, without the intervention of a user. Thus the system can be characterized as a maximization of automation compared to the existing system.

2.2 The Improvement Plan

By automating the closing process, The Company intended to shorten the lead time for closing, to make the process consistent, and to remove unnecessary tasks while at the same time strengthening the core competency as an information provider. That is, The Company came up with an improvement plan that considers both the width and depth of the process. This plan is shown in Table 1.

First, since the automated closing system is designed to do closing based on predefined policies, these policies must be clearly established and the ability to apply them enhanced. In particular, with full adoption of IFRS from 2011, Korean companies need to detail their practice guidelines and follow global standards. Therefore, The Company planned to change their GAAP based accounting standards to IFRS based standards, detail their practice guidelines, open a portal site so that employees can browse accounting standards, guidelines, and FAQs, and educate the relevant employees about new standards.

Second, because closing process automation is intended to automate data transaction, managing raw data is important. Therefore, while enhancing the ability to manage stand-

Table 1
The Improvement Plan for Closing System

Scope	Improving points	Improvement plan
Data Transaction	Organizing global policy	Organize the company GAAP based on IFRS : detail practical guides Unify global standards
	Strengthening validation	Build real-time data validation Improve the competency of data with additional monitoring
Closing Process	Maximizing closing automation	Remove unnecessary tasks Minimize manual or machine hour in a unit task Make sequence of tasks visible
	Optimizing closing process	Reestablish the order of process Load balancing Reduce Idle time to zero

Note: Table 1 provides the improvement plan for closing system.

ard information, The Company built a system to check standard information data in real time, and made a system improvement plan to strengthen the competency of data with additional monitoring.

Third, since closing system automation is intended to close the book quickly, the ability to manage total lead time spent on the closing process is important. Therefore, The Company needed to maximize closing automation and optimize the closing process. The process of maximizing closing automation includes changing ways to identify automated tasks and redefining the concept of automation, IT dependence, and manual, thereby identifying tasks that can be automated. In the old system, a task is identified as automated as long as amounts are calculated or sales statements are created within the system, even when data is extracted or index is input manually. However, in the new system, a task is identified as automated when all work flow is automated. The concept of ‘automation’ in The Company will be

explained in detail in section 3.

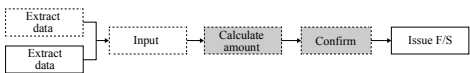
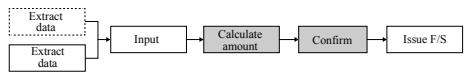
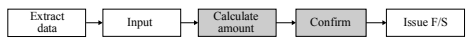
Lastly, the optimization of the closing process includes reorganizing tasks based on activity analysis and minimizing lead times by balancing. In the earlier system, Business Process Management (BPM) was inefficient, and idle time occurred. Specifically, the order of the closing process was not well understood, and one employee was conducting multiple tasks simultaneously, causing idle time. To alleviate these problems, in the new system, the order of tasks in BPM was reorganized, and load balancing by time and individual is designed to remove idle time.

III. The Design of the Automated Closing System

3.1 The Concept of Automation, IT Dependence, and Manual

Previously, we considered the closing process automation as the full automation

Table 2
The Concept of Automation, IT Dependence, and Manual

Methods	Concept	User Intervention	Done Within/Outside System
Manual	An activity or task that worker himself check data without preset logics, confirm the outcomes, and input them into the system, with the support of system. 	O	Outside
IT dependence	An activity or task that workers are able to affect by adjusting logics or parameters, which are set beforehand. 	O	Within
Automation	An activity or task that is conducted by a system with preset logics and parameters, and without user intervention. 	X	Within

Note: Table 2 provides the concept of manual, IT dependence, and automation. A square with a bold solid line represent automated process. A square with a thin solid line represent online process. A square with a dotted line represent offline process.

of existing closing process. To help understanding, the concepts of manual, IT dependence, and automation are visualized below in Table 2. First, manual refers to closing outside of the system. In such cases, system can support closing, but basically workers themselves check data without preset logics, confirm the outcomes, and input them into the system. Compared to this, IT dependence refers to a closing process conducted within the system, and it differs from manual since a whole or a part of the logics are set beforehand. However, workers are allowed to adjust and create logic settings and parameters, thus they can affect the closing process.

In contrast to this setting, automation does not allow for workers to affect the process, because it is all done by the system following predefined logics and parameters. In 3.2, based on the above distinctions between automation, IT dependence, and manual, we will look at the designing process of an automated closing system.

3.2 The Designing Process of an Automated Closing System

Since closing is done within the system automatically, it is critical to build a good data validation system. To build a better system, The Company decided to validate data

Table 3
The Designing Process of Closing Process Automation

Stage	Mission	Contents
1	Current status analysis	Review closing process Analyze closing activities Analyze related issues and Data Manipulating Language (DML)
2	Interviews with in-charges	Interview in-charges Identify additional issues areas for improvement
3	Confirming KRI	Choose KRI Confirm KRI to in-charges Confirm KRI
4	Defining KRI conditions	Define KRI conditions (standards/deviation/dept. in charge) Analyze KRI building process

Note: Table 3 provides the designing process of closing process automation.

Table 4
Definition of Activities and Derived Requirements

	Accounting Task	Method		Validation Report	
		before	After	Existing	If required
1	Calculation of contingent liabilities from litigation	Manual	Automated	None	Not required
2	Royalty	Manual	Automated	None	Required
3	Estimation of unused inventory	Manual	IT dependent	None	Required
4	Confirmation of consolidated COGS	Manual	IT dependent	None	Required
5	Net settlement of global pooling	IT dependent	Automated	None	Required
6	Management of conversion cost allocation rate	IT dependent	IT dependent	None	Required
7	Confirmation of employees in charge for closing	IT dependent	IT dependent	Exist	
...					

Note: Table 4 provides the definition of activities and derived requirements.

in advance, instead of afterwards, and elaborate the validation tasks by managing KRI (Key Risk Index). Table 3 summarizes the four stages of the design process of the closing process automation.

In the first stage, the existing closing process is reviewed and closing activities are analyzed through current status analysis. As presented in Table 4, closing activities include such tasks as the calculation of contingent liabilities from litigation, royalties, and the estimation of unused inventory. After analyzing the existing accounting system, 231 activities were identified to be related to the closing process. Next, managers identified the method of an activity as being automated, IT dependent, or manual. They then checked whether it could be automated. In addition, to guarantee consistency at each stage, they also checked whether there is a validation report and if it is needed.

In the second stage, additional issues and areas for improvement are identified from interviews with employees, and in the third stage, KRI is chosen and confirmed. KRI consists of three types of validation; standard information validation, real time validation, and periodic validation. Previously, it took

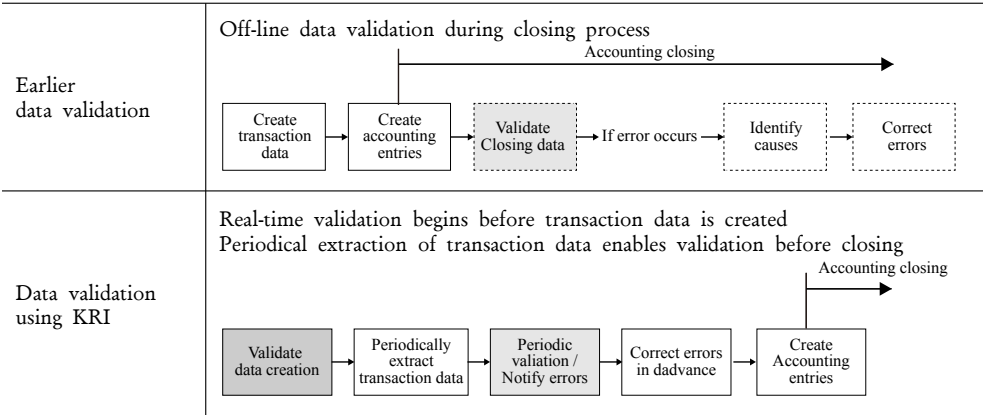
some time to validate and correct errors because off-line validation of data transaction was needed. However, if KRI is used, data can be automatically validated in real time or periodically. Consequently the data contains few errors and closing process times were shortened. Figure 1 shows a comparison between the existing data validation process and the validation process using KRI.

In the fourth and final stage, conditions such as numerical standards, deviation, and departments in charges were defined for each KRI, and a KRI comprehensive report was prepared. Below are examples of KRI comprehensive reports related to accounting issues.

Example 1 is a comprehensive report for validation of consumption quantity for BOM (Bills of Material). It is very important for a manufacturing firm, like The Company, to make accurate estimates on consumption quantity for BOM.

However, from interviews, it was revealed that delivery amounts are often miscalculated because of errors in estimating consumption quantities for BOM. To alleviate this problem, The Company set prevention of errors of delivery amount through validation of con-

Figure 1
Improving Data Validation



Note: Figure 1 provides the illustrative comparison between earlier data validation and data validation using KRI. A square with a bold solid line represent automated process. A square with a thin solid line represent online process. A square with a dotted line represent offline process.

sumption quantity for BOM as a KRI. In the new system, the logic is designed so that consumption quantities for BOM are checked daily, and any errors in the data can be made known to the BOM creator. Validation of consumption quantity for BOM belongs to standard information validation.

Example 2 is a comprehensive report for validation of asset acquisition costs. From interviews, it was discovered that errors were occurring in EPS (Equipment Purchasing System), since asset acquisition cost was validated manually. To alleviate this problem, The Company set securing the accuracy of asset acquisition cost by automatic validation of the cost as a KRI. In the new system, the logic is designed such that asset acquisition cost sent from EPS, and recorded amounts in AP (Asset Payable) and FA (Fixed Asset) entries are validated automatically within the system. Validation of asset acquisition cost belongs to validation in advance.

3.3 KRI Operating Process

After implementation, The Company tried to optimize the automated closing system by continual development of KRI. For example, The Company reviewed ongoing issues from the operation of the newly designed closing process, and monitored closing data to find areas for improvement and check and adjusted the process. Figure 2 summarizes this operating process.

IV. Impacts of Closing Process Automation

4.1 Impacts of Closing Process Automation

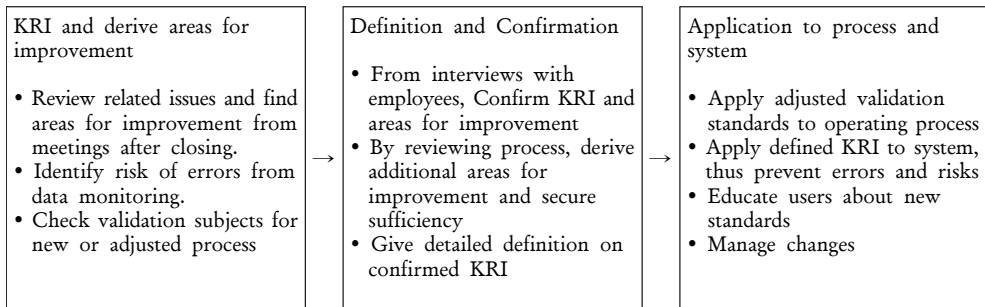
Below we discuss the impacts of closing process automation.

4.1.1 Maximization of Closing Process Automation

First, closing automation is maximized, and up to 82 percent of the tasks are automated. This is because IT dependent tasks became automated and manual tasks became IT dependent or automated, and further, the accuracy of information was improved in some of the tasks that were already automated prior to the implementation of the automated closing system.

An example of change from manual to automation is the estimation of warranty reserve, which involves estimating repair costs for breakdowns within service warranty periods and recognizing these costs as warranty reserve. In the earlier system, the warranty period is checked off line, and inputed into the system. Closing of GS (Global Sales) and RMA (Return Merchandise Authorization) is also checked off line. In addition, monthly A/S cost calculations were available only after cost calculation, thus there was a lead time. However, in the automated system, the warranty period is automatically

Figure 2
KRI operating process



Note: Figure 2 provides the KRI operating process.

derived from the RMA system and applied to the calculation of sales and repairing required volume. And, per cost of A/S is derived from last year's costs, so lead time is removed.

Another example of the change of method is offset of unrealized gains (losses) from internal transactions, which was changed from IT dependence to automation. This task offset unrealized gains (losses) that occurs when an equity method applied company sell their inventory or tangible asset to the parent company. Previously, when a transaction occurred, an employee in charge of closing checked and inputted the related data. In contrast, in the new system, the data is automatically interfaced between companies without a manual works.

The results of the maximization of closing process automation include that, non value-additive manual work is removed, human or machine hours¹⁾ are minimized, closing sequences become more visible, and loads for current tasks are reduced.

4.1.2 Improvement in Raw Data Validation

Improvement in raw data validation guarantees improved consistency of the raw data, which works as a basis for maximization of closing process automation. Specifically, validation is improved so that past data errors are categorized by their type and removed before the closing process. For example, when unit purchasing costs or selling prices are inputted, the acceptable range relative to the value of prior months or a guide price for prices is set to prevent errors. As another example, when currency rates are inputted manually in foreign branches, an acceptable range relative to the value of the day before is set and notified to reduce possible errors. Such raw validations are done in real time or periodically, depending on the characteristics of an item, and, as a result,

1) By implementation of new system, Man or Machine hour is reduce from 811 hours to 435 hours.

data errors decreased substantially, from 55 times per month under the previous system to 5 times per month under the automated closing system.

4.1.3 Optimization of the Closing Process

The order of unit activities was redefined and analyzed to identify the optimal order, thereby optimizing the closing process. Specifically, the lead time for closing was shortened by load balancing, and idle time was reduced to zero by redefining the order of the process.

4.2 Difficulties and Considerations for Successful use of the System

To use the new system successfully, various aspects of a The Company (i.e. production, accounting, technology, support, and management) needed to be assessed comprehensively. The managers of The Company also experienced trial and errors while using the new system. As such, there are several practical considerations for successful use of the automated closing system that need to be taken into account.

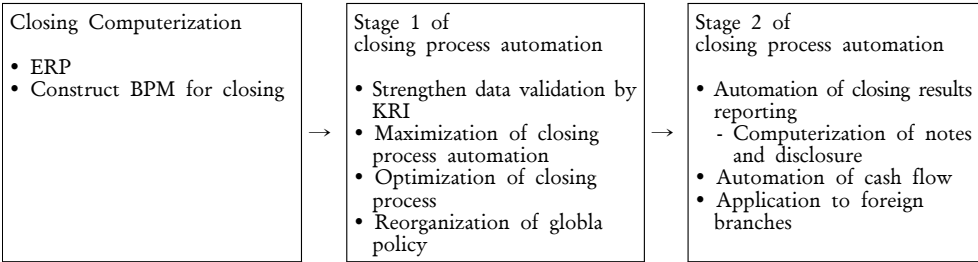
First, the implementation of a new system causes many changes and flow on changes, and managing such changes is an important issue. In the case of The Company, employees did not have detailed enough understanding of closing process automation. For example, they did not fully recognize changes in the closing process, and it took some time to validate automatically calculated data. In response to this, The Company improved employees' proficiency of the closing process and validating ability and emphasized in monthly seminars that employees should have new mind set for new closing process.

Second, deficiencies were observed in maximization and optimization of the closing system. There were issues with the order of closing activities, and errors in data logic were also observed. Responding to these issues, The Company reorganized and adjusted the BPM order, and also supplemented ERP logic.

Third, in order to achieve sustainable results, The Company proposed a further improvement plan on a long term basis. The closing system further improvement plan is shown below in Figure 3. In AIS perspective, maximization of closing process automation initiated by The Company falls into the stage

of measurement and recording by accounting managers. As a next step to closing process automation, The Company is now conducting analysis to automate financial reporting. Detailed analysis contents and the required constructs in the 2nd stage of the closing process automation are presented in Table 5.

Figure 3
Closing System Improvement Plan



Note: Figure 3 provides the closing system improvement plan.

Table 5
Further Improvement Plan

	Item for Analysis	Analysis Details	Items to Build
Notes/ Cash Flow	Notes by items	Plan for automation by reviewing production of notes for 36 comprehensive items	Integrated system for notes and cash flow
	Cash Flow Statement production	Plan for automation of cash flow statement items	
	Report data Validation	Plan for cross validation between note/cash flow items and closing data	
	Data collection and integration	Identify sources and plan to build integrated data	
	Examine solutions	Check if outsourced solutions are needed	
Apply closing automation to foreign branches	Examine ways to apply head's process to branches	Analysis of difference in closing adjustment items between head and branches	Maximization of closing process automation
	Analysis of manual statements	Integrate different adjustment standards among branches Plan for automation of closing adjustments by items Construct closing process set for production/sales branches	Optimization of closing process
	Find areas for improvement in closing of branches	Find additional objects for closing data and areas for improvement Consider applying first validation to other branches	Strengthen improvements of closing in the areas and validation in advance

Note: Table 5 provides the further improvement plan.

V. Conclusion

A company records accounting information about its operations and provides the information to its users to help them make rational decisions. Thus, it is important in practice to extract accurate data and conduct this process quickly. The Company is now progressing with its closing system automation with a long-term established plan to build a successful closing system, and this new system has made substantial improvements in maximization of closing automation, enhancement of consistency in raw data, and optimization of the closing process.

This case study is intended to provide a concrete example of detailed building process and it is expected to be beneficial to both academics and practitioners. Specifically, this study introduces demands for closing system automation, system designing process, operating process, expected impacts, and related issues. However, there is a limitation that this study does not consider industry differences. Therefore, further study is needed to take into account industrial characteristics in developing closing system.

We expect that our study is able to extend the area of AIS related studies by its discussion of closing system automation, and further we hope that the concrete examples in this study will give meaningful information to those who may be considering implementing closing system automation. We also expect that our study will be partic-

ularly helpful for small and medium enterprises which suffer from delayed closing but have little experience with automated BPM system.

Received 22 Nov. 2016

Revised 28 Feb. 2017

Accepted 02 Mar. 2017

References

- Bragg, S. M. (2009). *Fast close*, Wiley, 2nd edition.
- Ettredge, M. L., C. Li, and L. Sun (2006). "The impact of SOX Section 404 internal control quality assessment on audit delay in the SOX era," *Auditing: A Journal of Practice & Theory* 25(2), 1-23.
- Francis, J., R. LaFond, P. Olsson, and K. Schipper (2004). "Costs of equity and earnings attributes," *The Accounting Review* 79(4), 967-1010.
- Hammersley, J. S., L. A. Myers, and C. Shakespeare (2008). "Market reactions to the disclosure of internal control weaknesses and to the characteristics of those weaknesses under section 302 of the Sarbanes Oxley Act of 2002," *Review of Accounting Studies* 13(1), 141-165.
- Palmrose, Z. V. and S. Scholz (2004). "The Circumstances and Legal Consequences of Non GAAP Reporting: Evidence from Restatements," *Contemporary Accounting Research* 21(1), 139-180.

결산 자동화 시스템 사례

권대현*, 안태식**, 황인이***, 박진하****

장부를 마감하고 재무제표를 작성하는 것은 대부분의 기업에 있어서 주요한 과제이다. 본 연구는 결산 자동화 시스템의 도입을 통해 결산과정을 상당부분 개선한 기업의 사례를 조사하고 해당 시스템의 실행과 관련하여 발생한 주요 이슈들에 대해 논의하고자 한다. 이에 본 사례연구에서는 결산 자동화 시스템의 도입목표 및 개선방안, 결산절차, 추진결과와 활용방안 등을 연구하였다. 구체적으로 첫째, 결산 자동화 시스템하의 결산 과정을 상세히 소개하였다. 둘째, 결산 자동화 시스템 도입의 효과를 살펴본 결과 결산 자동화 비율이 극대화 되고, 데이터 검증 작업이 보다 정확하게 이루어짐에 따라 결산 과정에서 발생할 수 있는 오류가 감소한 것으로 나타났다. 또한 결산 순서가 새로이 정의됨에 따라 결산에 소요되는 시간도 감축되었다. 다시 말하면, 결산 자동화 시스템의 도입으로 결산 전반에 대한 속도, 품질, 통제 등이 제고된 것으로 평가되었다. 마지막으로 도입 및 운용 시에 고려해야 할 부분에 대해 제안한다. 본 사례연구가 결산시스템을 개선하고자 하는 기업들에게 구체적인 도입 과정을 예시하고, 또한 운용 시에 고려해야 할 부분에 대한 시사점을 제공할 수 있기를 기대한다. 특히 사례에 포함된 구체적인 예시는 자동화 시스템에 대한 경험이 상대적으로 적은 중소기업에게 도움이 될 수 있을 것이다.

주제어 : 결산 과정, 결산자동화, 회계정보시스템

* 주저자, 숙명여자대학교 경영학부 부교수(e-mail: kdh98871@sm.ac.kr)

** 공동저자, 서울대학교 경영대학 교수(e-mail: ahnts@snu.ac.kr)

*** 공동저자, 서울대학교 경영대학 교수(e-mail: hiny72@snu.ac.kr)

**** 교신저자, 숭실대학교 회계학과 조교수(e-mail: parkjh04@ssu.ac.kr)