

The Impact of ERP Systems on Accounting Processes

Despina Galani, Efthymios Gravas, Antonios Stavropoulos

Abstract—Advances in information technology, recent changes in business environment, globalization, deregulation, privatization have made running a successful business more difficult than ever before. To remain successful and to be competitive have forced companies to react to the new changes in order to survive and succeed. The implementation of an Enterprise Resource planning (ERP) system improves information flow, reduce costs, establish linkage with suppliers and reduce response time to customer needs. This paper focuses on a sample of Greek companies, investigates the ERP market in Greece, the reasons why the Greek companies are investing in ERP systems, the benefits that users have achieved and the influence of ERP systems on the use of new accounting practices. The results indicate a greater level on information integration, flexibility in information access and greater functionality provided by ERP systems but little influence on the use of new accounting practices.

Keywords—Advanced Accounting Practices, Enterprise Resource Planning, Management Accounting.

I. INTRODUCTION

IN today's highly competitive, rapidly changing global economy, organizations have been forced to consider, and in many cases to implement ERP systems or similar integrated systems. ERP systems are integrated software packages that enable companies to combine various business units of different areas such as production, sales, marketing, finance, human resources creating a tightly integrated system with flow of information across the entire business. The interest of organizations for ERP and other innovative applications such as Relationship Management (CRM), Knowledge Management, e-commerce, m-business, Warehouse Management Systems (WMS), Project Management tools has increased. The administration and the executives of a company are invited to make specific choices to serve the company's goals concerned with the internal organization and efficiency, or the external environment (market competition), with the best possible combination of investment-benefit.

The ERP system has received significant attention from academic research focuses on the motivations for implementations and the factors contributing to the success and failure of ERP projects [[19],[1],[14]] and the ERP benefits [[25]] obtained from implementing the ERP system.

The implementation process is a very complex procedure, and needs to be checked against several success/failure factors to ensure successful implementation, as well as to avoid implementation risks[[1]]. Many organizations are recognized as having successfully ERP implementation and some others abandon implementation of ERP projects or fail to achieve their intended result. Reference [[5]] states that awareness of cultural differences and preferences will certainly improve the assessment of ERP suitability and any subsequent implementation and suggests to developers and consultants to adapt their products and services for different cultural markets.

The most important success factors for ERP implementation include top management support, business plan and vision, effective communication, [[16]]. Factors related to change of management systems and culture, management support, organizational structure, BPR project management, IT infrastructure, are considered reasons for ERP failures [[1]].

ERP systems have been criticized for not being that flexible and not meeting specific organization needs. Consequently, some organizations have developed their own applications known as best of breed systems.

The present study explores the impact of the organization's information system on strategic planning, operational planning, reporting, flexibility, efficiency. The tasks of data collection, reporting, analysis and budgeting are investigated. Additionally, the adoption of more advanced management accounting practices after the implementation of the integrated systems are explored.

The remainder of this paper is organized as follows. The next section reviews the literature concerning the motivations, the success measures for ERP implementations and perceived benefits.

II. LITERATURE REVIEW

One of the most important topics in the area of information systems and accounting are the ERP systems. In the past ten years many Greek companies have adopted ERP systems or similar integrated systems in order to enhance their competitiveness and to meet the challenges of the new business environment.

An ERP system is a set of business applications or modules, which links various business units of an organization such as financial, accounting, manufacturing, and human resources

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into a tightly integrated single system with a common platform for flow of information across the entire.

In practice it can be difficult to classify a software as an ERP system or a non-ERP system[[2]]. Reference [[28]] uses the word of integration of functional areas of business as a criterion for this classification. Generally, the word integration is closely connected with enterprise applications. It is considered that integration is a way of making applications work together by passing information through some form of interface[[11]]. The integration of applications is one of the main reasons for the ERP adoption [[23]].

However, ERP systems have not solved the integration problems as many companies do not abandon their legacy systems and they integrate their functionality from disparate applications. ERP systems are not a solution for a business but can enhance the need for integration [[26]].

There are several forces that are potentially influencing an organization's decision to adopt ERP systems. According to recent surveys the reasons motivating organizations to adopt ERP systems are technical and business reasons and can be summarized in table 1 [[13],[27],[5]]. Reference [[13]] identify various reasons that motivate a company to adopt ERP systems classifying them into two categories: Technical reasons and Business reasons. They also suggest that there should be a relation between the reasons for adoption to the perceived benefits of ERP, by analyzing financial and non financial benefits.

According to reference [[27]] survey, for Finish companies, the most frequent motivation for ERP implementation is to replace the old legacy system, the Y2K problem, the need for a new integrated system, and the ease of upgrading to new versions, the need for a common financial strategy and vision throughout the organization, or the need to have a common system with a newly acquired company. Another survey for Greek companies indicated that the three most popular reasons for adopting ERP systems are increased demand for real-time information, information for decision making and integration of applications [[18]].

Reference [[19]] examined initial motives in the adoption of ERP in e-government, classifying them into four categories: a) technological motivations (have to do with infrastructure), b) operational motivations (concern the improvement of processes), c) performance motivations (are contingent on the will to improve results) and d) strategic motivations (are linked to a change in orientation in the design and delivery of services. According to the results, drivers behind the decision to adopt ERP are technological motivations (search for integration of IT) and performance motivations (lower maintenance and operational costs).

Studies on the impact of ERP systems on management accounting practices have been conducted [[10],[12],[21],[3],[23]].

Reference [[3]] study compares ERP users to their prior legacy systems and with those of non-ERP users. They conclude that ERP users are highly satisfied with reporting and decision support for finance and financial accounting but

they are less satisfied for transaction processing. They found that ERP systems have only a small effect on the use of new management accounting practices that emphasize sophisticated manipulation of information.

Reference [[10]] found that eight out of ten companies applied ABC in at least some parts of their organization but these ABC systems were not configured into ERPs. The reason for not using ABC models in ERPs was the current ERP system complexity. They found that ERPs did not influence the companies' decision to adopt ABC as many of these firms were already familiar with this concept. They concluded that ERPs do not seem to have a major influence on the development of balanced scorecards that are maintained in a spreadsheet or Lotus Notes environment or a special software designed for that purpose.

Reference [[12]] compares the ERP systems versus best of breed (BoB) systems and proved that when the motives were only either technical or strategic, the solutions were more often BoB and when the motives were technical and strategic the solution was more often ERP than BoB. He concludes that there is no correlation between the adoption of ERP systems and the use of modern cost accounting and modern management accounting techniques. The results indicated that 27% of the respondents have adopted activity-based costing (ABC) and 24% of all respondents have adopted balanced scorecard.

Reference [[21]] found that there were not fundamental changes after the ERP implementation, in the nature of management accounting information but there were changes in the role of management accountants such as the elimination of routine jobs, line managers with accounting knowledge, more forward looking information and a wider role for the management accountants.

Reference [[23]] found that integration of applications, real time information are the main reasons for Greek companies to adopt ERP systems. They report that after the ERP implementation a number of companies introduced financial ratio analysis, production of budgets, profit centers, absorption costing and profitability analysis per customer. They conclude that the fact that some potential benefits from ERP adoption have not been highly rated due to the infancy of these systems.

III. METHODOLOGY

To determine the answers to the research questions, a paper based survey was prepared and administered at organizations that had implemented an ERP systems and "gone live" and organizations that have tried other solutions like best of breed systems or other similar integrated systems to satisfy information needs. Data collected from 30 Greek companies. The first group consists of 12 ERP users and compared with 18 non-ERP users. Managers responsible for the integrated system implementation in their organizations were chosen as the target recipients as they were best placed to provide informed responses to the range of issues covered in the survey. Most of the questions asked were open-ended concerning topics as the perceptions of general information

system quality and accounting information system quality and the adoption of new management accounting practices. The questionnaire was pretested with three respondents to check its validity. A cover letter and survey questionnaire were distributed to managers responsible for integrated systems in the company.

Responses to the questions were measured on a 5 point Likert scale 1=very poor to 5=very good. The data was codified and analyzed using SPSS 16.0. Techniques included descriptive statistics and independent samples t-test were used.

IV. VARIABLE MEASUREMENT

The first question addresses the reasons for IS implementation. Reference [[7]] states that companies adopt IS for technical reasons or to enhance strategy and competitiveness. To evaluate the reasons for IS implementation the respondents were asked: "What were the reasons for which your company decided to implement the IS: Y2K problem, Lack of accuracy of the previous system, Introduction of EURO currency, Eliminate redundant data entry, Reduce data errors, Decrease computer operating costs, Reduction of number of different systems, Development of business process, Enable business growth, Changes in competitive environment. The first six issues classified as technical reasons and the last four issues as strategic reasons.

Research question 2 and 3 is concerned with the perceptions of the impact of the organization's information system on Strategic planning/decision-making, Operational planning/decision-making, Reporting, Flexibility and Efficiency for ERP and non-ERP users correspondingly. The respondents were asked: "How would you rate the information system on each area" for the current integrated systems and the previous legacy system. The ratings for each area were then used to compare the differences between ERP and legacy systems, non-ERP and legacy systems and ERP and non-ERP users.

Next research question is concerned with the satisfaction with the support of different management accounting tasks derived from information system. The respondents were asked: "To what extent are you satisfied with the support of different traditional management accounting tasks: Data collection, Reporting, Analysis and Budgeting".

Investigating the relationship between information system and management accounting practices a task focus on management accounting is applied. In this article is used the research conducted by reference [[3]] and reference [[20]]. The tasks that are included in this article are classified into data collection, reporting, analysis and budgeting.

The task of data collection consists of the data recording in the general ledger as well as collection and recording of non-financial data.

The reporting tasks include the making of profit and loss statements and several kinds of segmented profitability reporting, but reporting on non-financial data is also included.

Analysis is based on historical data and can be performed on a continuous as well as an ad hoc basis.

Budgeting concerns the collection of budgets from different departments within the company.

Finally, the adoption of more advanced management accounting practices after the implementation of the integrated systems was obtained from the following list:

Activity based costing (ABC) assigns manufacturing overhead costs to products in a more logical manner than the traditional approach of simply allocating costs on the basis of machine hours. Activity based costing first assigns costs to the activities that are the real cause of the overhead. It then assigns the cost of those activities only to the products that are actually demanding the activities.

Life Cycle Costing (LCC) also called Whole Life Costing is a technique to establish the total cost of ownership. It is a structured approach that addresses all the elements of this cost and can be used to produce a spend profile of the product or service over its anticipated life-span. The results of an LCC analysis can be used to assist management in the decision-making process where there is a choice of options. The accuracy of LCC analysis diminishes as it projects further into the future, so it is most valuable as a comparative tool when long term assumptions apply to all the options and consequently have the same impact.

Target costing is a cost management tool for reducing the overall cost of a product over its entire life-cycle with the help of production, engineering, research and design. A target cost is the maximum amount of cost that can be incurred on a product and with it the firm can still earn the required profit margin from that product at a particular selling price.

Benchmarking is the process of comparing one's business processes and performance metrics to industry bests and/or best practices from other industries. Dimensions typically measured are quality, time, and cost. Improvements from learning mean doing things better, faster, and cheaper.

Balanced scorecards are financial and non financial measures that give information to every part of the organization. The measures are a balance between external measures for customers and shareholders and internal measures of business processes, innovation and learning and growth [[15]].

For each practice, respondents were asked whether the practice was applied in their organization. Answers to this question were used to compare relative accounting practices between ERP and non-ERP users.

V. RESULTS

The first question addresses the reasons behind IS investment. The motives are presented in Figure 1. The most common reasons were the lack of accuracy of previous system, reduction of number of different systems, eliminate redundant data entry and reduce data errors. Further, another important motive was the "development of business process" which is a very strategic one and usually requires BPR in some extent.

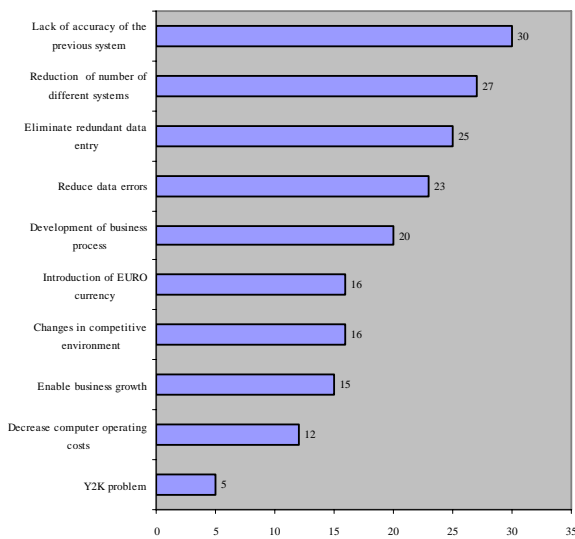


Fig. 1 Reasons for is implementation

The impact of the organization's information system on strategic planning, operational planning, reporting, flexibility, efficiency is investigated. The higher quality of information from ERP systems should provide better support for overall strategic planning and operational planning. Moreover, the integrated systems and the higher level of the system functionality should provide greater support for general information reporting and organizational flexibility and efficiency [[3]].

The findings in Table 1 indicate that the quality of information provided for strategic and operational planning is in a higher level comparing the integrated systems with the legacy systems, as well as reporting, flexibility and efficiency. Specifically, the mean rating for the integrated systems were greater than adequate, while that for the legacy systems were less than adequate. Both ERP and non ERP users report a significant improvement in the quality of information of the new integrated system, results that are in line with the findings of Booth et al. study. Moreover, table 1 shows that ERP users report higher ratings than non ERP users in all areas. Also, both ERP and non ERP users ratings are greater than adequate in all five areas. However, all these differences are not significant. This indicates that the perceptions for the high quality and the benefits of ERP systems exist only when ERP systems are comparing with the legacy systems and not when ERP systems are comparing with other integrated systems. Non- ERP users with integrated systems perceive that they have adopted high quality systems.

TABLE I GENERAL INFORMATION SYSTEM QUALITY

	Strategic planning	Operational planning	Reporting	Flexibility	Efficiency
LEGACY	2.08	1.83	1.92	1.83	1.75
ERP	3.33	4.99	4.5	4.25	4.33
T	-2.957	-7.288	-10.549	-8.817	-11.285
Sign	0.00	0.00	0.00	0.00	0.00

	Strategic planning	Operational planning	Reporting	Flexibility	Efficiency
LEGACY NON	2.056	1.899	1.889	1.889	1.944
ERP	3.278	3.722	4.278	4.111	4.00
T	4.716	8.765	13.638	12.575	8.735
Sign	0.00	0.00	0.00	0.00	0.00

	Strategic planning	Operational planning	Reporting	Flexibility	Efficiency
ERP NON	3.33	4.00	4.50	4.25	4.33
ERP	3.28	3.72	4.28	4.11	4.00
T	0.13	0.94	0.89	0.49	1.10
Sign	0.90	0.36	0.38	0.60	0.28

The tasks of data collection, reporting, analysis and budgeting are presented in tables 2 and 3. The satisfaction with the support of different management accounting tasks derived from ERP systems is analyzed. Descriptive statistics for ERP users' perceived satisfaction are summarised in table 2. The results reveal a very high level of satisfaction from ERP adoption for data collection. The satisfaction of different management tasks is high with all mean ratings between adequate and good. Comparing ERP users and non ERP users it is observed that both have a very high level of satisfaction for data collection. There is still high satisfaction with performance for reporting and analysis. There is noticeably less satisfaction for budgeting tasks for non ERP users than the ERP users. The only mean rating that is less than adequate is that of budgeting with value equal to 2,78. It is concluded that ERP and non ERP users are satisfied with their ERP or similar integrated systems.

TABLE II PERCEPTIONS OF ACCOUNTING INFORMATION SYSTEM QUALITY FOR ERP USERS

ERP USERS	Data collection	Reporting	Analysis	Budgeting
Mean	4,42	3,50	3,17	3,08
Std Dev	0,67	0,52	0,58	0,67
Min	3	3	2	2
Max	5	4	4	4
N	12	12	12	12

TABLE III PERCEPTIONS OF ACCOUNTING INFORMATION SYSTEM QUALITY FOR NON-ERP USERS

NON-ERP USERS	Data collection	Reporting	Analysis	Budgeting
Mean	4,39	3,78	3,72	2,78
Std Dev	0,78	0,81	0,96	0,55
Min	3	2	2	2
Max	5	5	5	4
N	18	18	18	18

Adoption of more advanced management accounting practices after the implementation of the integrated systems was also examined. Moreover, it is examined whether ERP users adopt more advanced management accounting practices than non-ERP users. The results are summarised in Table 4.

TABLE IV ADVANCED MANAGEMENT ACCOUNTING PRACTICES

Advanced management accounting practices	ERP	NON-ERP
Activity-based costing	30%	20%
Target costing	40%	35%
Life-cycle costing	35%	35%
Benchmarking	50%	40%
Balanced scorecards	45%	20%

Table 4 presents the advanced management accounting practices considered in the present survey. The results obtained indicated that, of ERP users, 40% have adopted target costing, 35% life cycle costing and 30% activity-based costing as their cost accounting practice. 35% of the ERP users have adopted target costing and life-cycle costing and 20% have adopted activity-based costing as a cost accounting practice. This means that individuals of this survey having adopted some to the modern cost accounting practices, still continue using some traditional cost accounting techniques. Additionally, 55% of the ERP users and 35% of the non-ERP users have adopted balanced scorecards.

Further, it was studied if there are differences between the two groups as regards adoption of modern management accounting practices. Can one assume that implementation of either system would induce more probably adoption of advanced management accounting practices. A Pearson chi-square test was run on each technique to confirm if there are statistically significant differences between ERP and non-ERP users. However, no significant differences were found.

On the basis of the discussion above, one can say that ERP and non ERP implementations have not affected modern accounting practices in organizations. The results confirm the earlier observation made by references [[3],[10],[12]] that ERP systems do not have any significant effect on adoption of innovative management accounting practices. In conclusion, both ERP and similar integrated systems have initiated employment of modern management accounting techniques although the differences between the two groups are not considerable.

VI. CONCLUSIONS

This paper reported the results of the effects of ERP systems on the quality of the organization's information system and the use of new management accounting practices. The findings for the quality of the information system provided for strategic and operational planning is in a higher level comparing the integrated systems with the legacy systems, as well as reporting, flexibility and efficiency.

Both ERP and non ERP users report a significant improvement in the quality of information of the new integrated system, results that are in line with the findings of reference [[3]] study. Moreover, it is concluded that ERP users report higher ratings than non ERP users in all areas. Also, both ERP and non ERP users ratings are greater than adequate in all five areas. However, all these differences are not significant. This indicates that the perceptions for the high quality and the benefits of ERP systems exist only when ERP systems are comparing with the legacy systems and not when ERP systems are comparing with other integrated systems. Non- ERP users with integrated systems perceive that they have adopted high quality systems.

In addition the findings indicate a very high level of satisfaction from ERP adoption for data collection. The satisfaction of different management tasks is high with all mean ratings between adequate and good. Comparing ERP users and non ERP users it is observed that both have a very high level of satisfaction for data collection. There is still high satisfaction with performance for reporting and analysis. There is noticeably less satisfaction for budgeting tasks for non ERP users than the ERP users. It is concluded that ERP and non ERP users are satisfied with their ERP or similar integrated systems.

Introduction of more advanced management accounting techniques were also considered to indicate changes in management accounting practices. Both ERP and similar integrated systems have initiated employment of modern management accounting techniques although the differences between the two groups were not considerable. It seems that ERP systems have only a small effect on the use of new management accounting practices. This is similar to prior studies that ERP systems have had a little impact on the use of new management accounting practices that emphasise modern accounting practices rather than simply extracting and reporting transactional data.

REFERENCES

- [1] Al-Mashari M., and Zairi, M.,1999, "BPR implementation process: an analysis of key success and failure factors", Business Process Management Journal, Vol. 5 No.1, pp.87-112.
- [2] Beheshti, H. M., 2006, "What managers should know about ERP/ERP II" Management Research News, vol. 29, no. 4, pp. 184-193.
- [3] Booth, P., Matolcsy, Z., and Wieder B.,2000. "The impacts of enterprise resource systems on accounting practice-The Australina experience", Australian Accounting Review, Vol. 10, No. 3.
- [4] Brown, C.V. and Vessey, I., 2003, "Managing the next wave of enterprise systems:Leveraging lessons from ERP, MIS quarterly executive, pp. 65-67.
- [5] Chand,D., Hachey, G., Hunton, J., Owosho, V., and Vasudevan,S., 2005, "A balanced scorecard based framework for assessing the

- strategic impacts of ERP systems", *Computers in Industry*, vol. 56, pp. 558-572.
- [6] Davison, R., 2002, "Cultural Complications of ERP", *Communications of the ACM*, Vol. 45, No. 7, pp.109-111.
 - [7] Davenport, T.H., 2000, *Mission Critical: Realizing the Promise of Enterprise Systems*, Harvard Business School Press, Boston, MA.
 - [8] Esteves, J., 2009, "A benefits realisation road-map framework for ERP usage in small and medium-sized enterprises", *Journal of Enterprise Information Management*, Vol.22 No.1/2, pp. 25-35.
 - [9] Gardiner, S.C., Hanna, J.B. and LaTour, M.S. 2002, 'ERP and the re-engineering of industrial marketing processes: a prescriptive overview for the new-age marketing manager'. *Industrial Marketing Management*, 31: 357-365.
 - [10] Granlund, M., and Malmi, T., 2002, "Moderate impact of ERPS on management accounting: a lag or permanent outcome?", *Management Accounting Research*, Vol. 13, pp. 299-321.
 - [11] Gullledge, T., 2006, "What is integration?", *Industrial Management & Data Systems*, Vol. 106, No. 1, pp. 5-20.
 - [12] Hyvonen, T., "Management accounting and information systems: ERP versus BoB" *European Accounting Review*, 2003, 12:1, p.p. 155-173.
 - [13] Markus M.L. and Tanis C., 2000, "The enterprise system experience-From adoption to success". *Framing the Domains of IT Management: Projecting the Future Through the Past*, Pinnaflex Resources, Inc, Cincinnati, OH, pp.173-207.
 - [14] Markus, M.L., Axline, S., Petrie, D., and Tanis, C., 2000, "Learning from adopter's experiences with ERP: problems encountered and success achieved", *Journal of Information Technology*, vo. 15, pp. 245-265.
 - [15] Meena Chavan, "The balanced scorecard: a new challenge *Journal of Management Development*", 2009, Vol. 28 No. 5, pp. 393-406.
 - [16] Nah, F.F., and Lau, J.L., 2001, "Critical factors for successful implementation of enterprise systems", *Business Process Management Journal*, Vol.7 No 3, pp.285-296.
 - [17] O'Leary, D. *Enterprise Resource Planning Systems: Systems, Life Cycle, Electronic Commerce, and Risk*. New York: Cambridge University Press, 2000.
 - [18] Poulymenakou, A.K., and Borotis, S.A., 2005, "Adoption of enterprise resource planning systems in Greece", P. Bozanis and E.N. Houstis (Eds), LNCS 3746, pp.559.
 - [19] Raymond, L., Uwizeyemungu, S., Bergeron, F., 2005, "ERP adoption for e-government: an analysis of motivations", *eGovernment Workshop '05 (eGOV05)* Brunel University.
 - [20] Rom, A., and Rohde, C., 2006, "Enterprise resource planning systems, strategic enterprise management systems and management accounting. A Danish study", *Journal of Enterprise Information Management*, Vol. 19 No.1, 2006, pp. 50-66.
 - [21] Scapens, R.W. and Jazayeri, M., 2003, "ERP systems and management accounting change: opportunities or impacts? A research note", *European Accounting Review*, vol. 12, no. 1, pp.201-233.
 - [22] Soja, P., 2004 "Success factors across ERP implementation phases: Learning from practice".
 - [23] Spathis, C. and Constantinides, S., 2004, "Enterprise resource planning systems' impact on accounting processes, *Business Process Management Journal*, Vol. 10, No. 2, 2004, pp. 234-247.
 - [24] Siriginidi, S.R., 'Enterprise resource planning in re-engineering business', *Business Process Management Journal*, 6(5): 376-91, 2000.
 - [25] Shang, S. and Seddon, P. B., 2002, "Assessing and managing the benefits of enterprise systems: the business manager's perspective", *Info Systems J*, vol. 12, pp. 271-299.
 - [26] Themistocleous, M., Irani, Z. and O'Keefe, R.M., 2001, "ERP and application integration. Exploratory survey", *Business Process Management Journal*, Vol.7, no. 3, pp.195-204.
 - [27] Velcu O., 2007, "Exploring the effects of ERP systems on organizational performance. Evidence from Finish companies", *Industrial Management & data systems*, vol. 107, no. 9, pp. 1316-1334.
 - [28] Xenakis, J.J., 1999, "A Mile Wide and a Mile Deep", *CFO*, February.