One Company's Experience With Accounting Information System Changes- An Analysis Of Managers' Satisfaction

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Abstract

During the past ten years management accounting has been frequently criticized by many researchers, who have then suggested ways to improve management accounting systems. As a result various companies have modified their accounting information systems by incorporating some of the suggested changes. Unfortunately, little research has been presented which analyzes managers' reactions to management accounting system changes (Bamber, 1993). This paper provides an overview of a company that upgraded its accounting information system by adopting some of the suggested changes. Results from questionnaires administered before the change, shortly after the change, and about one year after the change were used to provide a comparison of managers' reactions to the changes. The company, in this study, incorporated various changes suggested in the literature by providing managers with real-time databases and involving managers during the development of the new system. In response to the changes, the managers indicated they were more satisfied with the accounting department and the data provided and they now focused more on production quantity than previously. Therefore, the company appears to have successfully implemented changes in their accounting information system, which improved managers' satisfaction with the system.

Introduction

*B*ecause relevance got lost, according to Johnson & Kaplan (1987), much has been written regarding the limitations of traditional management accounting and what needs to be done to correct the problems. Numerous

articles have appeared in *Management Accounting*, a journal that is widely read by U.S. industry accountants, suggesting that management accounting information systems are irrelevant. For instance, Howell & Soucy (1988) indicate that current management reporting systems do not provide management with the information needed. Problems cited include accounting reports that are not useful

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and cluttered with too much data and detail, poor communication tools, or incomplete for many users' needs (Howell & Soucy, 1988; Hanks, 1988). Brausch (1992) suggests that manufacturing executives have lost faith in cost accounting and cost accountants. Managers studied by McKinnon & Bruns (1993) complained that they frequently prepared their own information because accounting data were often received too late and/or presented in a manner that was not useful.

Suggestions offered to improve management accounting systems include getting accountants more involved with operations, use of real-time systems, and increased involvement during the development of the management information systems (Greer et al., 1992; McKinnon & Bruns, 1993). Additionally, Roth & Borthick (1989) stress the need for flexible management accounting systems and suggest that flexibility can be improved by providing managers with data bases. Developing new systems, however, does not guarantee that better information will be provided (Brausch, 1992). Boer (1991) suggests that accountants need to focus on what will make information systems useful to managers and provide that information in a manner that encourages improvements.

Ferrara's (1991) review of current research findings led him to suggest that we need to find out if new systems do in fact promote desired results. Due to the recent avalanche of criticisms and suggestions, some companies have begun to change their management accounting systems. Unfortunately, little research has been presented that examines managers' reactions to these changes (Bamber, 1993; Foster & Young, 1997). Results from this study provide information on a company that updated their accounting information system by adopting some of the recently suggested changes. The objective of the study was to assess whether or not the changes in the organization's management accounting information system did in fact improve managers' attitudes toward the accounting information.

Possible Indicators of Success for Accounting System Changes

Some prior research findings may provide insight into factors that could be used in determining the success achieved from the implementation of changes in accounting information systems. For example, early accounting research indicated that accounting controls were sometimes rigidly used in organizations despite managers' knowledge of the existence of complex tasks that required flexibility (Hertzog, 1978; Ansari, 1979). As a result, some managers felt that the accounting measures were unfair, subjective, uninfluenced by a variety of important factors, and thus incapable of providing a true description of managerial activities (Lawler & Rhode, 1976; Hayes, 1977). Recently, Briers and Hirst (1990) also concluded that the effectiveness of accounting information as a control mechanism was related to both its content and how it was used.

Due to past criticisms of financial measures and the increased availability of computerized data bases many organizations now provide managers with non-financial information for evaluation purposes (Shields, 1997). As a result, researchers have suggested that accountants need to focus on combined accounting and management information systems rather than just accounting information systems (Brecht & Martin, 1996).

Although little research has been devoted to the area of non-financial measures (Hemmer, 1996), managers will likely be able to express their degree of satisfaction with these measures just like they have done in the past with financial measures. Therefore, a new accounting system might be viewed as more successful than an old system if managers are more satisfied with the financial and non-financial data provided by the accounting department than they were with information from the old system.

In the past a great deal of research has been devoted to the effectiveness of budgeting as a

technique to communicate accounting data and improve performance. With respect to budgeting, Hopwood (1972), Bruns & Waterhouse (1975), and Otley's (1978) studies indicate individuals' attitudes were affected by the perceived importance and acceptability of accounting data for evaluation purposes. Collins et al. (1984) also found that managers' perceptions were impacted by the perceived degree of usage of accounting data. Furthermore, managers who were ranked as the best performers perceived a stronger relationship between good performance and the attainment of the reward (Lawler & Porter, 1967; Cherrington & Cherrington, 1973; Maher et al., 1979).

Most recently, Jones & Dewing (1997) also concluded that a fit needs to exist between accounting information and the needs of the users, and in order to impact performance the accounting data must be judged appropriate by the managers. Thus, managers will likely form some opinion regarding the usefulness of the new accounting system as compared to their previous system with respect to performance evaluation. Additionally, managers should perceive a stronger linkage between their pay and performance if the new system provides better information regarding the relationship of variations in performance to variations in pay.

Participation in the budgeting process has also been suggested as a way to improve motivation, performance, attitudes, and satisfaction with accounting controls (Hofstede, 1967; Cherrington & Cherrington, 1973; Milani, 1975; Hopwood, 1972; Brownell, 1982; Young, 1985; Birnberg et al., 1993; Nouri & Parker, 1998). Furthermore, participation may provide managers with additional information, which results in an improved understanding of the link between performance via the budget and reward (Brownell & McInnes, 1986; Kren, 1992; Dunk, 1993).

Although the research on participation has produced mixed results (Kren, 1997), companies

continue to use participation as a means of gaining acceptance for changes. In part, this may be due to the fact that employees often resist changes in the accounting system since they know how to work the old system and are not sure how to work the new system (Foster & Ward, 1994). In any event, top management often apparently agrees with Jones & Dewing's (1997, p. 264) statement that "accounting controls cannot be successfully imposed upon unwilling recipients." Therefore, promoting participation among managers and implementing their recommendations during accounting system changes should improve their acceptance and satisfaction with the new system.

In the past, accounting research has focused on the budget as one of the primary control mechanisms in organizations, however, computerization has recently provided companies with the means to move control devices closer to those being controlled on a timely basis. As a result, management information systems (MIS) research has begun to look at satisfaction with computer systems in much the same manner that accountants previously looked at budgets. For example, MIS researchers have attempted to analyze what causes MIS development failure or success in much the same way that accountants sought to determine what caused budgeting to be successful or not. In this vein, MIS researchers have focused on user satisfaction as a surrogate for system success based on the belief that satisfaction with the system will ultimately determine its success or failure (Kim, 1989; Cushing, 1990; Szajna & Scamell, 1993; Yoon et al., 1995; Lu & Wang, 1997). Thus, assessing accounting information system changes based on user satisfaction may be a good way to determine whether or not the new system is a success or failure.

The quality of MIS service has also been looked at in terms of customer satisfaction. For instance, Delone & McLean's (1992) research findings indicated that system and information quality were critical to success along with infor-

mation use and user satisfaction. Watson et al. (1998) measured the difference between expectations and perceptions and found that management had to close the expectations' gap to improve perceived service quality of MIS. Similar to budgeting research in accounting, MIS research has also suggested that one way to close the expectations gap and improve the chances for system success is by involving individuals in the process, i.e., increase participation (Doll & Torkzadeh, 1988; Cushing, 1990; Choe, 1996).

Sambamurthy & Chin's (1994) research also suggests that users' attitudes towards new technology have an impact on how much the technology will be used. They further maintain that these attitudes are the result of how user friendly the technology is and how useful the information is that the system generates. Their results indicate that the more positive the users' attitudes toward the system the higher the use of the system. Gelderman (1998) further notes that the system will be used if it improves performance and information requirements are met. These research findings add further credence to Doll & Torkzadeh's (1988) contention that meeting users' needs revolves around the timeliness of the information, how easy it is to use, the importance of the information provided, and how understandable the format is.

Thus, new accounting information systems (AIS) are likely to be viewed more positively than old systems if the desired information is perceived to be provided and appropriate to improving performance on the job. Additionally, users' satisfaction with the new system should increase if they participate in the process and the changes result in a system that is easier to use and provides more timely information that is considered important in a useable format.

Combining findings from both AIS and MIS research suggest several questions that might be used to judge whether accounting system changes are in fact improvements from the manager's perspective. Therefore, the analysis pre-

sented in this paper revolves around the following questions:

- Are managers more satisfied with the AIS under the new system?
- Do managers perceive performance evaluation to be more useful under the new system?
- Do managers perceive a stronger link between performance and pay under the new system?
- Are managers more satisfied with non-financial data provided under the new system?

The Company

General Background

The company described in this study is a manufacturing firm located in the northeastern U.S. whose products are sold primarily in the building and transportation market. It represents one of 250 locations throughout the U.S. and 31 other countries. In 1994 this company's mix generated about 14% of consolidated revenue. While we are not allowed to disclose the name of this particular company or any of its financial data, some general information about the consolidated entity can be provided.

The consolidated entity is listed on the New York Stock Exchange and in 1995 had about 179 million shares of common stock issued and outstanding. In 1994 the consolidated entity's total revenue was approximately 10 billion and most of its manufacturing companies were operating at 80% of world-wide capacity. In 1996 the consolidated entity's earnings per share was \$4.66; by 1997 revenues had grown to 13.3 billion and consisted of 21 business units employing 100,000 employees.

The Controller's Vision

During the initial meeting, the controller explained that the company was soon to begin the

process of implementing a new AIS. Clearly, the controller hoped that the new system would address several areas of concern that had emerged as a result of conversations with the management group. The second meeting involved a discussion of why the controller felt changes were necessary and what changes he envisioned. For example, he seemed to feel that flexible accounting systems needed to be designed so that they captured and communicated the relevant information needed to improve the firm's ability to adapt to change (Frank et al., 1989). He also appeared to agree with Runk & Loretta (1989) that improving the AIS required the controller to make an assessment of the financial function and how effectively it responded to management's changing needs and expectations. Additionally, he had attempted to determine what services were needed but not available, what was available but not needed, and how effectively essential services were delivered. Furthermore, like Johansson (1990), he felt that assessing and improving the AIS's effectiveness required the controller to take a more proactive role by moving accountants from their offices to the production floor.

Additionally, the controller appeared to agree with Ross (1992) that the challenge faced by accounting today is that:

- control needs to be put at the operation level
- real time information needs to be used
- empowerment not obedience should be employed
- information should facilitate decision making not police it
- incentive systems should be built to reinforce teamwork
- systems should add value
- accountants should be actively involved as agents of change

He also believed, similar to Jayson (1992), that accounting should identify its internal users, utilize a team-oriented approach to the improvement of processes, and promote bottom-up empowerment.

Since the company was implementing many of the changes that had been suggested in the literature, it appeared to be a prime candidate for study. Additionally, at the time the controller was contacted no changes had been made so the research project would be able to encompass a period that looked at the company prior to, during, and after the changes.

Old System versus New System

Under the old system, the company used an AIS for performance evaluation, product costing, and financial reporting, which the controller indicated suffered from problems similar to those recently cited in *Management Accounting* and similar journals. The company utilized three production centers as cost pools in order to determine production costs and profitability. The costs assigned to the production centers included direct, indirect, controllable, and non-controllable costs. Additionally, several service departments provided services to each other as well as to production centers. Under the old system, the costs of service departments were allocated to production centers using a step-method in order to partially recognize interdepartmental service and production center services.

The old system was based on a top-down management style for the determination of budget amounts, which were then provided to managers of the three production centers. The reports given to the three production managers contained controllable costs, as well as non-controllable and indirect costs due to the allocation of overhead.

Under the old incentive system, the employees' profit-sharing plan was tied to the consolidated entity's profitability. In other words, an employee's bonus was not based on individual performance in the company but rather on how well the consolidated entity did. As a result, although employees in this company may have performed very well they might fail to get a bonus because the consolidated entity did not per-

form well, i.e., the link between performance and reward was weak at best.

Under the new system, a new costing and performance evaluation system was implemented, and at the same time a new accounting software package was brought on-line. The new system assigns departmental costs to production centers based on use. The controller believes the new cost flow will enable the accounting department to produce reports for production centers that contain only those costs controllable by the center's manager. According to the controller, this approach would help pinpoint responsibility for costs and allow the preparation of performance reports for all departments based on responsibility. In order to facilitate this process, service department managers were to project a budget of monthly and annual spending, and service rendered to production. Once this was done the service department managers were to negotiate and sign contracts with the production center managers for the amount of service they required in the upcoming period and this would become the basis for sharing costs.

The new system, unlike the old system, was expected to be a bottom-up approach to managing costs. A collaborative and cooperative environment was envisioned by the controller, since he believed the sharing of information between and amongst levels of management would be crucial to each department's forecast and ultimately the department's success in terms of profit. In an attempt to enhance acceptance of the new approach, a new profit-sharing plan, which tied bonuses to the company's profits rather than the consolidated entity's profits was devised to provide a stronger link between actual performance and reward received.

Under the new system, three production centers exist with support from various service departments. Employees in service departments and production areas will share in the profit specifically generated by their production center. The controller hopes that this will motivate the

managers in service departments to hold down costs since their costs affect their production center's profitability. This, in turn, impacts the departmental employees' share of the production center's profit. Additionally, all managers are now given access to all other managers' budgets and actual costs. Under the new system, service department and production center managers receive daily and/or weekly controllable costs spending reports that compare their actual costs to forecasts submitted. Table 1, which was provided by the controller, presents a comparison of old and new system features.

Although initially setting up the new system required a lot of thought and additional work on the part of the controller and the accounting department, the controller felt that once the system was operational everyone would benefit. From his perspective the accounting department would prepare fewer reports since the accounting information would be entered into the system and managers could then generate their own reports based on the information needed. Additionally, the managers would have more timely information since they would have free access to the accounting data in the system rather than just month-end reports.

Basic Demographics

Of the thirty-seven managers who participated in this study, 75% were male, 82% held college degrees and 55% were between the ages of twenty-six and forty-five. Fifty-five percent had been with the company sixteen years or longer, 56% had been in their present position four years or less, and 55% were in top or middle levels of company management. Furthermore, a little more than half (58%) of these managers felt that evaluating their performance with accounting data was appropriate and indicated they understood the linkage between the accounting data performance evaluation (Performance Report variances) and the reward (bonus). With respect to job ambiguity 58% indicated clarity concerning their job role and more

Table 1
Accounting Information System Features
 (Provided by the Company's controller)

<u>Old System</u>	<u>New System</u>
Batch Mode	Real time
Results 10 days after EOM	Daily updates
Complicated cost allocations	Easy-fast allocations to business units
Complicated sharing of costs by business units	Direct assignment of all spending to owners
Complicated labor distributions to maintenance, departments, and production	No labor distributions
Monthly arguments over maintenance job costs	No maintenance job costing
Hard to understand and explain	Simple
Used strange accounting terms such as burden budgets, idle facility costs, under/over absorbed expense, standard cost variations, direct labor, indirect labor, and maintenance labor	Department spending + or - inventory changes = COGS; No production lot costing; Direct tracking and drill down of spending by owner to the line item and each journal entry
Many costs charged to department heads not controllable by them	Costs assigned to person who has control (owner); Reduced spending overall by operations; Better cost control; Better understanding of business's costs of operation

than half (58%) indicated a good relationship with their supervisor and had high levels of motivation.

Study Design

All direct contact was strictly between the researchers and the controller, at no time during the study was there any interaction between the researchers and the managers who participated in the study. During the initial visits, the controller provided information regarding the general organizational climate, the old accounting system, the new accounting system, and specifics relating to the company. Additionally, interviews with the controller were used to determine the extent to which performance report variances were used to determine bonuses along with his perceptions regarding the appropriateness of using variances for performance evaluation purposes.

After the first two visits with the controller, a questionnaire was developed to collect data for examining the views of management personnel.

On the third visit the questionnaire was reviewed with the controller to ensure that the items were understandable and terminology regarding the performance report was clear. This was particularly important since the company had a variety of performance appraisal methods and this study was only concerned with performance reports that incorporated accounting data (for example, performance report variances) for appraisal purposes.

Information on Questionnaires

The first (one month before the new system), second (six months after the new system), and third questionnaire (one year after the second questionnaire) were provided on site to managers whose performance evaluation involved the use of Performance Report variances. The questionnaires were developed by combining items from the Michigan Organizational Assessment Questionnaire (Cammann et al., 1983) and The Perceived Work Environment Questionnaire (Newman, 1974). The general areas of demo-

graphics, supervisory style, motivation, job facets (performance-reward link), and task role characteristics (job and goal ambiguity) were covered by items in the questionnaires. Additionally, questions were added to gather data regarding respondents' reactions to their performance reports, specific accounting reports, and the accounting department.

The third questionnaire was modified due to complaints from the managers regarding the length. This was done by deleting questions related to demographics (job facets, and task role characteristics), and adding questions addressing satisfaction with and usefulness of the new accounting information system. Unfortunately, the modification of the third questionnaire posed a problem in the area of data analysis. As a result, only items common to all three questionnaires were used for analysis and presentation of the results.

Open-ended Questionnaire Items

Due to the exploratory nature of this study some feedback from managers was requested in order to assess whether or not the company's old accounting system suffered from problems noted by previous researchers and whether or not any changes could be noted over the period under study. The first questionnaire contained two open-ended questions asking the managers what they liked most and least about their present system. In terms of what they liked least, items mentioned were similar to those noted earlier (Howell & Soucy, 1988; Hanks, 1988; Mckinnon & Bruns, 1993), such as, not real-time, too much data, too much detail, too complex, not user friendly, and not a useful management tool. Apparently, this company's old AIS did suffer from problems noted by previous researchers from the managers' points of view.

The second questionnaire also included the same two open-ended questions. This time managers indicated that the new reports were easier and quicker to read, simpler, more timely, and the information was more accessible. They,

however, still felt that the reports lacked flexibility, did not have enough information, required too much work, contained questionable data, and details were not available. At this point in time, the managers also indicated they wanted a more complete cost accounting system, further refinement of the reports, more detail, more flexibility, more training, and more input regarding information to be provided.

Based on results of the first and second questionnaire, company officials were given some summary information and encouraged to increase training regarding the importance of the performance reports for improving performance and pay plan pay-out (bonus), and use of the new AIS. Additionally, the company was urged to pay particular attention to the areas the managers still wanted improved.

As a result of the managers' responses to the second questionnaire and our suggestions, the company provided the managers with on-line access and added several additional items to the AIS. Essentially, the managers were given access to the information as soon as it was entered into the computer system to which all managers were linked. Originally the new system provided only aggregated information regarding transactions. The system was upgraded to provide aggregate as well as detailed information for all transactions. The information regarding actual vs. planned spending was enlarged to allow the managers to actually see the individual items that caused the spending variations. Information regarding the pay plan pay-out (bonus) was also provided so that the managers could determine their bonus at any point in time based on their actual performance results.

The third questionnaire also elicited the managers' responses concerning what they liked most, least, and still wanted added to the new accounting system. They indicated that they liked the amount of detail provided, ease of use, timeliness of the data and ease of access. With respect to what they liked least they indicated that the system was too slow, printing reports

Table 2
Rotated Component Matrix

Questionnaire Item	Factor 1 $\alpha = .8753$	Factor 2 $\alpha = .83$	Factor 3 $\alpha = .40$	Factor 4 $\alpha = .8966$	Factor 5
43	.911				
42	.876				
11	.698				
40	.622				
35	.612				
39	.535				
25		.846			
24		.841			
18		.720			
26		.682			
34			.702		
23			.581		
22			.523		
27				.811	
28				.680	
36					.871

Extraction Method: Principal Component Analysis

Rotation Method: Varimax with Kaiser Normalization

was difficult, and some data were not in proper end use form. Based on the responses to the two open-ended questions over the three time periods it appears that the company successfully implemented many of the changes suggested by researchers in the first section of this paper (Roth & Borthick, 1989; Greer et al., 1992; Mckinnon & Bruns, 1993).

Statistical Methods

In an attempt to summarize the results of three questionnaires and provide some preliminary insight regarding the effect of the company's efforts, component analysis was used for data reduction purposes, and analysis of variance was used to compare overall results. Although this approach may raise questions about the appropriateness of the data analysis due to possible changes in respondents over the three collection periods, an examination of respondents' demographic data suggests only a few changes occurred.

Dependent Measures

Component analysis, using a Varimax rotation, of the questionnaire items common to all three questionnaires resulted in five factors (Table 2), which accounted for about 70% of the total variance. A review of the questionnaire items that loaded on each factor resulted in the following names for each factor; 1) satisfaction with accounting department and financial data, 2) usefulness of variances for performance evaluation, 3) satisfaction with non-financial data, 4) perceived linkage between performance and pay, and 5) concern for production quantity (Table 3).

The questionnaire items utilized a seven-point Likert scale anchored (1) *strongly agree* to (7) *strongly disagree*, thus the lower the mean response the more satisfied the managers were with the accounting department and the financial data, and non-financial data. With respect to the perceived performance/pay linkage, the lower the mean the stronger the linkage and the more useful variances were perceived to be. Regard-

Table 3
Descriptive Statistics
Five Factors and Three Time Periods

	<u>Questionnaire</u>	<u>Mean</u>	<u>Standard Deviation</u>	<u>Respondents</u>
Accounting Satisfaction	1	3.4095	1.4138	35
	2	4.0045	1.7363	37
	3	2.7793	1.0794	37
	Total	3.3976	1.5099	109
Usefulness of Variances	1	2.9429	1.1743	35
	2	3.0541	1.0377	37
	3	3.3378	1.4979	37
	Total	3.1147	1.2526	109
Performance/Pay Linkage	1	3.6429	1.4731	35
	2	4.0405	1.2930	37
	3	3.4324	1.6464	37
	Total	3.7064	1.4864	109
Non-financial Satisfaction	1	4.2190	1.3085	35
	2	4.7658	1.5110	37
	3	3.4955	1.1564	37
	Total	4.1590	1.4226	109
Concern for Quantity	1	2.5429	1.5213	35
	2	2.7297	1.7583	37
	3	1.8108	.8110	37
	Total	2.3578	1.4626	109

- Questionnaire items utilized seven-point Likert scale (1=strongly agree and 7=strongly disagree)
- The lower the mean score the more satisfied managers were with accounting and non-financial, the stronger the performance/pay link, the more useful the variances and the higher the concern for quantity.

ing concern for production quantity, the lower the mean the more managers focused on the quantity they produced.

Grouping Variable

The three time periods were used as the independent variable. This resulted in a MANOVA (3 x 1) design (Table 4). The dependent measures were also used as a within variable because most managers responded to all three questionnaires (Table 5). Since the overall results did not appear to be affected, between analysis was used as the basis for presentation of the results.

Results and Discussion

Results of the analysis of variance are shown

in Table 5. Of the five dependent measures used, three proved to be significant; satisfaction with accounting department and financial data, satisfaction with non-financial data, and concern about production quantity. Post Hoc tests indicate that significant differences occurred between the second and third time periods (Table 4). These results appear reasonable because of the short time frame between the first two questionnaires; responses to the second questionnaire were obtained after the managers had been using the new system for about six months. The third questionnaire responses were provided about one year later. In addition, results were consistent for the three questionnaires in that differences in mean values indicated positive results for the changes.

Table 4
Multiple Comparisons*
Five Factors and Three Time Periods

<u>Dependent Variable</u>	<u>Time Period</u>	<u>Time Period</u>	<u>Mean Difference</u>	<u>Standard Error</u>	<u>Significance</u>
Accounting Satisfaction	1	2	-.5950	.338	.245
		3	.6302	.338	.196
	2	1	.5950	.338	.245
		3	1.2252	.334	.001
	3	1	-.6302	.338	.196
		2	-1.2252	.334	.001
Usefulness of Variances	1	2	-.1112	.295	1.000
		3	-.3950	.295	.552
	2	1	.1112	.295	1.000
		3	-.2838	.291	.997
	3	1	.3950	.295	.552
		2	.2838	.291	.997
Performance/Pay Linkage	1	2	-.3977	.349	.769
		3	.2104	.349	1.000
	2	1	.3977	.349	.769
		3	.6081	.344	.239
	3	1	-.2104	.349	1.000
		2	-.6081	.344	.239
Non-financial Satisfaction	1	2	-.5467	.314	.255
		3	.7236	.314	.070
	2	1	.5467	.314	.255
		3	1.2703	.310	.000
	3	1	-.7236	.314	.070
		2	-1.2703	.310	.000
Concern for Quantity	1	2	-.1869	.335	1.000
		3	.7320	.335	.093
	2	1	.1869	.335	1.000
		3	.9189	.330	.019
	3	1	-.7320	.335	.093
		2	-.9189	.330	.019

* computed using Bonferroni test

Focusing on changes between time period two and three can be justified for several reasons. First, this is the time period during which management closed the expectations gap by providing additional changes or improvements that users desired and enhanced chances for the system to be successful. Second, this is the period in which the managers learned how to work the new system. Third, managers during this period were allowed to participate in the process since the company implemented more changes based on their responses to questionnaire two, thereby

enhancing the chances for the changes to be successful.

Satisfaction with Accounting Department and Financial Data

Comparing the direction of the differences of the means for periods one, two, and three suggests that at time period two the managers were somewhat less satisfied than they had been at time period one and they were more satisfied at time period three (Table 3). These results, al-

Table 5
Tests of Between-Subjects Effects
Five Factors and Three Time Periods

<u>Source</u>	<u>Dependent Variable</u>	<u>F</u>	<u>Significance</u>
Between Surveys	Accounting Satisfaction	6.740	.002
	Usefulness of Variances	.959	.387
	Performance/Pay Linkage	1.614	.204
	Non-financial Satisfaction	8.444	.000
	Concern for Quantity	4.313	.016

though not supported statistically, lend credence to Foster & Ward's (1994) contention that managers need time to learn how to work the new system. The significant results (Table 4) between time period two and three indicate that the managers were more satisfied with the accounting department and financial data than they were previously. Thus, the AIS changes made by this company apparently were successful since the managers seem to be more satisfied with the accounting department and the financial data.

Additionally, the results seem to suggest that the company was able to close the expectations gap (Watson et al., 1998) from time period two to three. The results in this section add further credence to the open-ended question responses, which also suggested the company was successful in closing the expectations gap. Between time period two and three, in response to managers' requests, the company provided real-time information on-line, increased the detail of information, and provided additional information on actual vs. spending data and actual performance vs. bonus data. Furthermore, by time period three, the managers' written comments indicated that they believed the new system provided adequate detail, data were easy to access and use, and the information was timely.

These results support suggestions offered by various accounting researchers (Roth & Bor-thick, 1989; Greer et al., 1992; Jones & Dewing, 1997) that providing managers with a real-time system and involving them throughout the process of change results in improved satisfaction with the AIS. Furthermore, measuring sat-

isfaction with changes in the system may be a viable surrogate for judging the success or failure of system changes as suggested by MIS researchers (Kim, 1989; Cushing, 1990; Delone & Mclean, 1992; Szajna & Scamell, 1993; Yoon et al., 1995; Lu & Wang, 1997). This conclusion seems reasonable since the written responses to the open-ended questions and the statistical results presented here appear to be in agreement.

Satisfaction with Non-Financial Data

Results suggest that, although there is no evidence of change between the first and second questionnaire, by the time of the final questionnaire the managers were more satisfied with the non-financial data (Table 4). Therefore, changes in terms of types of non-financial data may have a positive impact on levels of satisfaction. Admittedly these results are only suggestive of the possibilities. Although no previous research exists to compare these findings to, it does appear that research in this area may be important as suggested by Brecht & Martin (1996) and Hemmer (1996). If companies are going to provide managers with non-financial data, as part of the AIS, then it is important to know whether or not the information is being provided in a way that improves managers' satisfaction with the data.

Concern for Quantity Produced

In time period one and two the managers were not focusing on the quantity commitments they produced (Table 3). Results, however, between period two and three indicate that the

managers focused more attention on their quantity commitments than they had previously. Although this outcome was not anticipated based on previous studies, it seems reasonable since the new system provided more information on production quantities needed to meet targets. Since this was a manufacturing firm and the managers were, for the most part, in production areas it appears that the information changes focused more of their attention on production targets in terms of quantity.

Usefulness of Performance Report Variances

Results were not significant for this factor (Table 4). Managers at time period one thought that variances were useful (Table 3); the new system did not appear to alter this perception. While previous research with respect to budgeting (Hopwood, 1972; Bruns & Waterhouse, 1975; Otley, 1978; Collins, 1984; Jones & Dewing, 1997) would suggest some improvement should have been achieved due to the increased focus on variances with the new system, the results do not support this contention. One possible explanation is that the managers already perceived variances to be useful and the changes made in the system were not sufficient to improve upon that perception. Another possibility is that the managers did not believe that the variances could be made more useful regardless of what was done or changed.

Linkage of Performance Report Variances with Pay (Bonuses)

Results for this factor were not significant (Table 4). Prior research suggests that the new system should have promoted a stronger linkage (Cherrington & Cherrington, 1973; Maher et al., 1979; Brownell & McInnes, 1986; Kren, 1992; Dunk, 1993) because it would provide more timely and improved information regarding variances and their impact on bonuses. Since the managers in this company already had a strong performance/pay linkage (Table 3) it is possible that providing real-time information could not

improve upon the strength of the relationship that already existed.

Conclusion

The managers' written comments indicated that before the new system was implemented, they felt the management accounting system was not real-time, not user friendly, not a useful management tool, and provided too much data and detail. After the implementation of the new system the managers indicated the system provided the appropriate amount of detail, was easy to access and use, and provided timely data. Based on these comments we conclude that the company was successful in implementing changes in their accounting information system.

Many of the changes implemented by the company had been suggested previously by accounting researchers, such as, real-time data bases, improved timeliness of information, and getting accountants more involved in operations. The results indicate that these changes improved the managers' satisfaction with the accounting department and financial data, non-financial data and increased their focus on production quantity. However, these changes did not increase the perceived usefulness of variances or strengthen the linkage between performance and pay.

This study was an exploratory field study and, as such, has various limitations. To ensure anonymity, the managers who completed the questionnaires over the three time periods were not asked to indicate their names, although demographic data were collected. As a result, there is no way to be sure that some shifts in managers did not occur during the three time periods. However, a review of demographic information suggests that changes, if they occurred, were minor.

Due to managers' complaints about the length of questionnaires only about twenty questions were identical, over all three periods, which limited the scope of the statistical analysis.

Furthermore, results must be viewed with caution since this study was primarily exploratory and liberties were taken in an attempt to capture evidence of change. In spite of these limitations, we believe that the results provide interesting insights regarding managers' reactions to accounting information system changes and some groundwork for future studies.

Suggestions for Future Research

Although the results of this study shed some light on managers' reactions to and acceptance of management accounting system changes more companies need to be studied before and after they change their system. Research also needs to be done on companies over a longer period of time to determine what changes and processes may cause managers to become more or less satisfied with the system over time. It may also be fruitful for future studies to utilize findings from both accounting information systems research and management information systems research since the two systems have become ever increasingly intertwined. □

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