AN EMPIRICAL INVESTIGATION
OF THE RELATIONSHIP BETWEEN
FIRM PERFORMANCE AND SYSTEM SUCCESS

by

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Abstract

This study investigates the relationship between system success as operationalized by user information satisfaction (UIS) and various economic measures of firm performance. The findings indicate a significant positive but complex relationship between firm performance and UIS. In particular, we found that it is inappropriate to aggregate UIS scores across individuals within a firm. The CEO, Controller, and Production Manager within a firm tended to have quite different UIS scores, resulting in low inter-rater reliabilities. We also found, that the association between a respondent's UIS score and the measures of firm performance depended heavily on the position of the respondent and the particular performance measure employed.

1.0 INTRODUCTION

System success is one of the most common outcome variables in MIS research. System success has been examined and related to a host of variables including user involvement [Ives and Olson, 1984], organizational maturity [Mahmood and Becker,1985-86], change and attitude toward change [Barki and Huff, 1986] to mention just a few. Unfortunately, system success is a broad concept, and it is not always clear what is meant or intended by this construct. In some studies system success may also be described by different labels such as system effectiveness [Srinivasan, 1985].

Ives and Olson [1984, pp. 591] argue that the ideal measure, and perhaps meaning of the concept, of system success is "the aggregate organizational benefit accruing from it (the computer based information system) when compared with alternative investments." Such an analysis would attempt to reveal the economic benefit of the system. Ives and Olson acknowledge, however, that such an economic analysis is difficult and rarely possible and non-economic measures are much more frequently used as a surrogate for system success.

Perhaps due to the difficulty of measuring system success as economic benefits, researchers have attached a number of different meanings to system success. Delone [1988] chooses to measure

system success by the reported use of the system by the chief executive and its impact as viewed by top management. Others [De Brabander and Thiers, 1984] define success differently, such as efficiency in the accomplishment of tasks. While a number of different concepts and measures of system success exist the one most commonly employed is that of user information satisfaction (UIS) [Ives and Olson, 1984; Baroudi and Orlikowski, 1988]. Alavi et al [1989] report in a ten year review of MIS research that studies of UIS account for 2.6% of all empirical MIS research. This is similar to the numbers of studies on IS strategic planning (3.2%) and IS interface characteristics (2.7%). Baroudi and Orlikowski [1988] report that in one year alone, over sixty requests for the Ives, Olson, and Baroudi [1983] UIS measure were received from both researchers and practitioners.

User information satisfaction has been defined as a "multidimensional attitude towards various aspects of the MIS such as output quality, man-machine interface, EDP staff and services, and various user constructs such as feelings of participation and understanding" [Raymond, 1985, pp. 38]. Several standard measures of UIS exist [e.g. Bailey and Pearson, 1983; Baroudi and Orlikowski, 1988; Doll and Torkzadeh, 1988] which probably have contributed to the widespread adoption of UIS as a measure of system success. Given the prevalence of UIS as a surrogate of system success it is important to consider the extent to which UIS actually relates to organizational performance as measured in

economic terms.

Much of the use of UIS as a dependent variable in empirical studies has been with the implication that a positive correlation with firm performance exists. The implicit assumption is that good management information systems are reflected in high UIS scores with the good MIS positively influencing firm performance. In contingency theory terms [Weill and Olson, 1989] the better the "fit" between the information system and the user's needs, the better the firm performance. This reflects the deterministic perspective that a manager who receives more accurate, timely, and useful information from his or her information systems is more satisfied with them; thus will be able to make better decisions which will ultimately influence and improve firm performance [e.g. Bender, 1986].

Recently, researchers [e.g. Melone, 1990] have begun to raise serious questions regarding UIS (i.e. do attitudes such as UIS translate into, or even relate to, behavior) which makes us question if there will be any relationship between UIS and firm performance. If no relationship exists between economic performance and UIS then this will affect the way we use UIS. Whether identified, implied or ignored, the relationship between UIS and firm performance has not been explicitly tested. This paper will examine the relationship between one definition of system success, user information satisfaction, and the economic performance of the firm.

The first section of this paper has provided an overview of the literature regarding system success, user satisfaction, and organizational outcomes. The research questions and hypotheses tested in this study are presented in section two. Section three outlines the research design and provides descriptive statistics on the sample and various measures. The data analysis and results are found in section four and the discussion and conclusions are presented in sections five and six.

2.0 Research Questions and Hypotheses

Given the prevalence of UIS as a measure we believe it is critical that the relationship between UIS and firm performance be examined. Therefore, the primary question this study will attempt to answer is as follows.

Q1: TO WHAT EXTENT DOES A RELATIONSHIP EXIST BETWEEN UIS AND FIRM PERFORMANCE AS MEASURED IN ECONOMIC TERMS?

It is our expectation that if any relationship exists between performance and UIS it will be small and subtle as the information technology (IT) of a firm is only one of many complex factors that may contribute to economic success. Additionally, we expect the relationship between UIS and firm performance to be complex as firms contain many managers with different perspectives and responsibilities. The UIS of one individual manager may not always

be assumed to be representative of the organization as a whole. In some of the UIS studies several different respondents UIS were collected and the UIS determined for the firm as an average [e.g. Baroudi and Orlikowski, 1988]. In other studies one respondent is questioned in each firm. In a study evaluating two different UIS measures, UIS data was collected from one source; "the accountant who is familiar with the computer-based general ledger" [Seddon and Yip, 1990]. An important issue, therefore, is whether a respondent's position influences their UIS score and then the relationship between UIS and the measures of firm performance. If it does, then averaging scores across positions could give a very misleading picture. Prior research [Zammuto, 1982] suggests that different individuals view performance from very different perspectives and performance must be assessed with respect to a particular interest group. Similarly, we expect that if one attempts to relate a manager's UIS score to a performance indicator then the performance indicator needs to be one of relevance and interest to that manager.

To illustrate, a marketing manager is generally interested in the market share of a product but probably has little knowledge of the labor productivity of the production line workers (a measure of particular interest to the production manager). It is expected, therefore, that if firm performance is measured in terms of labor productivity there will be no relationship between the marketing manager's UIS score and this performance measure. If, however, firm

performance is measured in terms of market share a relationship is more likely between the marketing manager's UIS score and this measure of firm performance. Thus a second question for this study is raised:

Q2: TO WHAT EXTENT IS THE ASSOCIATION BETWEEN A MANAGER'S UIS SCORE AND A MEASURE OF FIRM PERFORMANCE DEPENDENT ON THE POSITION OF THE MANAGER AND THE PARTICULAR MEASURE EMPLOYED?

The above questions can be explored by testing the following null hypotheses.

H1: There is no association between a manager's UIS score and any of the economic measures of firm performance.

H2: The association between a manager's UIS score and various economic measures of firm performance is not dependent on the manager's organizational function.

The research design, variables, and methods used to test these hypotheses are presented in the next section.

3.0 RESEARCH DESIGN

This study employed a cross-sectional survey of small to medium sized manufacturing firms (the number of employees averaged 572, S.D. of 1354) where three senior officers within each firm were asked about their firm's information technology. The CEO was asked to complete his/her questionnaire and pass on the other two to the controller and production manager respectively. The questionnaires requested information about the firms' IT investments as well as

UIS, firm performance and other relevant items.

Three senior respondents in different functional areas were included in order to test our second hypothesis. Given that we expected the relationship between UIS and firm performance to be small, we attempted to maximize our effect size by focusing our sampling efforts [Baroudi and Orlikowski, 1989]. This study only sampled the most senior level of firm management as we expected that if a relationship exists between UIS and firm performance the only way to detect it would be by including those most knowledgeable about the firm's economic performance. This of course raises another question, not addressed by this study, of the utility of evaluating clerical and lower level managers' UIS. We therefore cannot generalize the results of this study beyond senior organizational management[1].

3.1 Variables and Measures

The key variables in this study were UIS and firm performance. When asked to consider or evaluate IT the senior managers were given a broad definition of IT [Panko, 1982] which included all centralized and decentralized computing, communications, personnel and other resources dedicated to the management and use of IT. IT used as

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[1]There may be other reasons, however, to justify evaluating UIS at lower organizational levels such as job satisfaction, turnover, and employee well being (although none of these relationships have yet been explored empirically).

productive capacity [Weill, 1988] which does not contribute to the information management of the firm was excluded from this definition. This is usually IT that is embedded in devices that are dedicated to producing manufactured products (e.g. NC machines).

3.1.1 User Satisfaction

The measurement of how satisfied users are with their information systems (UIS) is one of the few standard measures available within IS research and has been subjected to a series of psychometric evaluations [Bailey and Pearson, 1983; Ives et al, 1983; Baroudi and Orlikowski, 1988; Doll and Torkzadeh, 1988]. This study adopted the measure as presented by Baroudi and Orlikowski [1988]. While other measures are available [e.g. Doll and Torkzadeh, 1988] the Baroudi and Orlikowski measure was deemed most appropriate for this sample of senior managers. Unlike other measures [e.g. Doll and Torkzadeh, 1988] this measure was specifically developed to focus on what managers reported as being important components of UIS [Bailey and Pearson, 1983] and thus should have high face validity with our sample of managers. This measure also has substantial evidence of construct and convergent validity as well as reliabilities (Cronbach Alpha) for each of the thirteen scales

exceeding 0.8 [Baroudi and Orlikowski, 1988]. In addition, this measure is one of the most frequently used scales and this study will place it under further scrutiny. If we fail to find relationships between UIS and firm performance this would be important information and might suggest this scale is not a good measure of success where the researcher is interested in a surrogate for economic performance.

In this study the UIS measure resulted in reliabilities (Cronbach Alpha) which all exceeded 0.77. The total UIS score was calculated as the sum of the 13 scales and potentially ranges from -39 to +39. Respondents in this study were asked to consider all "computer based support" as described in the prior section when answering the questions on UIS.

3.1.2 Firm Performance

There is much controversy about the measurement of organizational performance. Over 25 separate variables can be identified for operationalizing organizational effectiveness [Campbell et al, 1974]. Several different performance measures were used to cover different aspects of the firm from the perspective of senior management. Sales growth was used to measure the growth of the firm. Return on assets (ROA) was calculated by the controller for each firm by dividing the pretax profits by total assets. ROA was used as a measure of the profitability of the firm. Finally, a

labor measure was used to capture the productivity of the firm. The labor measure was the number of total employees adjusted for sales (total 1987 labor divided by million dollars of sales). These measures are referred to in this study as factual measures of firm performance. In addition, a perceptual measure of firm performance was used to capture the individual's general feeling of how the firm compared to its closest competitors; from greatly superior to very poorly on a five point Likert scale. A copy of these measures can be found in Appendix A. Firm sales was also collected as a measure of size or volume.

3.2 Unit of Analysis and Sampling

The unit of analysis was defined as the strategic business unit (SBU)[2]. An organization can have any number of SBU's and analysis at this level removes many of the aggregation problems of assessing firms. The potential aggregation problems include adding or averaging measures of important variables over a number of different businesses and losing or confounding information. The firms in this study were all small to medium sized (average sales

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[2] The SBU was developed by The Strategic Planning Institute in Cambridge, MA and was used in the PIMS study [PIMS, 1984]. A SBU has a distinct set of products or services and serves a specific group of customers. The SBU also competes with a well defined set of competitors.

of 62 million dollars, S.D. of 124 million), and were single SBU firms. Forty-five percent of the firms were privately held whilst the fifty-five percent were part of a larger group.

Five mailings were made to manufacturing firms in different industries with lists provided by manufacturing industry associations. In two of the mailings the manufacturing industry association also provided a covering letter endorsing the survey. Three of the mailings were to members of specific manufacturing industry associations (i.e. Valve Manufacturers Association, Food Equipment Manufacturers Association, and Machine Tool Manufacturers Association). The other two mailings were to general manufacturing associations (i.e. Society of Manufacturing Engineers and the Small Manufacturers Council). In total 319 companies were sent three questionnaires: one for the CEO, one for the controller, and one for the production manager. A total of 219 completed questionnaires: 83 CEO's, 64 controller's, and 72 production managers, where returned out of the questionnaires which where mailed. A total of 92 firms responded with at least one completed questionnaire.

Assuming medium effect sizes and using one-tailed significance tests, the statistical power levels are all above the prescribed 80% levels [Cohen, 1977; Baroudi and Orlikowski, 1989]. This allows us to maximize our chances of finding a relationship assuming one exists.

The design of the questionnaires followed the prescriptions of [Oppenheim, 1966]. None of the questions were personally intrusive in nature and thus the ordering of the measures was not considered crucial. The order of the measures followed the general principal of placing the relatively easy perceptual measures first followed by the quantitative factual questions. Demographic questions were relegated to the last page and marked as optional. Anonymity was guaranteed if the optional section was left blank. Better than 95% of respondents provided their names and firm names. All respondents provided their title.

3.3 Descriptive Statistics

The average firm employed 573 people and had an ROA of 8.5% and sales growth of 7.4% in 1987. The average firm invested 3.25% of 1987 sales in information technology and had 66 terminals, 26 personal computers and had used computers on a regular basis for 13 years. The means and standard deviations of the UIS and performance variables are given in table one. All 219 subjects provided responses to the UIS items and 216 respondents answered the perceptual performance measure. The factual performance measures, however, suffered from missing data with the N ranging from 156 for ROA to 168 for Sales and Sales Growth. The average UIS for the entire sample was 12.6 with the average CEO's UIS being higher than both the controller's UIS and the production manager's

UIS.

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===================================================================
Variable          Mean        Std Dev          N
===================================================================
UIS-Aggregate     12.6        12.4            219
UIS-CEO           15.3        12.1             83
UIS-Controller    11.2        12.2             64
UIS-Prod Mgr      10.8        12.5             72
ROA 87             8.5%        8.9%           156
Growth 87          7.4%       20.5%           168
Sales 87         $61.8M       $124M           168
Labor 87*         10.3         2.87           153
Market Share       4.0         7.0             91
Perform+           3.7         0.9            216
Perform-CEO        3.7         0.8             82
Perform-Control    3.5         0.9             63
Perform-Prod Mgr   3.8         0.9             71
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*Total labor per million dollar sales (People/$M Sales)
+ Perceptual performance on 5 point scale.
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Table One -- Descriptive Statistics

4.0 Analysis and Results

This section reports on the test of the two hypotheses.

4.1 Test of H1

H1: There is no association between a manager's UIS score and any of the economic measures of firm performance.

To test H1, Pearson product moment correlation coefficients were calculated for overall UIS and all of the various measures of performance. The column labelled overall UIS is the correlation between all of the subjects' individual UIS scores and their firms' performance measures. A single tailed test of significance was used. The correlation coefficients are given in table two.

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=================================================================
Performance     Overall   UIS       UIS           UIS
Measure         UIS       CEO       Controller    P r o d    M g r
=================================================================
ROA          0.15*,154    0.16,49    0.24*,55     0.04,50
Sales       -0.01,166    -0.24*,53  -0.02,59      0.22^,54
Growth       0.13*,166    0.14,53   -0.01,59      0.29*,54
Labor       -0.26**,152  -0.12,49   -0.21^,54    -0.45**,49
Perform+     0.29**,216   0.24*,82   0.29*,63      0.36**,71
-----------------------------------------------------------------
Each cell has two components: the Pearson r and the n.
-----------------------------------------------------------------
+ Perceptual performance on 5 point scale.
Significance: **<0.01, *<0.05, ^=0.1


=================================================================
   Table Two -- Correlations of UIS and Performance
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As can be seen from the above table, H1 is rejected. Several of

the factual measures as well as the perceptual measure of firm performance correlate significantly with overall UIS. Overall UIS significantly correlated with ROA ($r=0.15$, $p<0.05$), with growth ($r=0.13$, $p<0.05$), labor ($r=-0.26$, $p<0.010$) and perceptual performance ($r=0.29$, $p<0.01$) in the expected directions. These findings indicate there is a statistically significant relationship between UIS and the factual measures of firm performance. There is also a statistically significant relationship between the perceptual measure of firm performance and the UIS score[3]. In this data set firms with higher UIS scores were also better performers as measured by ROA, growth, labor productivity and a perceptual performance measure.

4.2 TEST of H2

H2: The association between a manager's UIS score and various economic measures of firm performance is not dependent on the manager's organizational function.

Table two also contains the correlations between the measures of firm performance and the UIS measures differentiated by job function. The patterns of correlation for each job function were quite different. No significant relationship existed between sales growth and the UIS scores for the CEO and controller while a strong and significant relationship existed ($p=0.29$, $p<0.01$) between this measure and the production manager's UIS score. For labor

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[3]The perceptual data for performance and UIS was gathered on the same instrument and may suffer from method bias.

productivity a strong and significant relationship occured with the production manager's UIS (p=-0.45, p<0.01) but not with the controller or CEO's UIS scores. For ROA, the only significant relationship was with the controller's UIS score. Therefore, H2 is rejected.   This was not true, however, for the perceptual performance measure which was significant and positive for all three managers in each firm.

Using table two we can see the dangers of aggregating the functional UIS scores into overall measures which are ascribed to a firm. The associations between UIS and performance were dependent on the responsibilities of the respondent. Only the controller's UIS was significantly associated with ROA. Only the production manager's UIS was associated with labor and sales growth. Sales (a measure of size rather than performance) was significantly correlated with both the CEO's and production manager's UIS but in different directions. Had we aggregated the UIS scores and correlated them with sales we would have concluded, incorrectly, that no relationship between sales and UIS exist.

To further test this question of aggregation, inter-rater reliability (IRR) was used.   The measure of IRR adopted was developed by James, Demaree and Wolf [1984].   IRR measures the extent to which the raters are interchangeable. IRR varies from 0 to 1 and a measure of one indicates complete interchangability. The inter-rater reliability of the three respondents UIS's was

0.035. This result indicates that it is not meaningful to aggregate, by averaging for example, UIS to create a firm-wide score. These results present a complex picture of the degree of association between individual UIS scores and the various firm performance measures.

4.3 Perceptual versus Factual Measures of Performance

From the above data it appears that senior managers responded differently to the performance measures depending on their responsibilities. To explore this notion further we examined the Pearson correlations between the perceptual performance measures and the factual measures.

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===============================================================
Perf.    Perceptual+      Perceptual+      Perceptual+      Perceptual+
Meas.      Overall           CEO            Controller        Prod Mgr
===============================================================
ROA      0.22**,52        0.12,48          0.31**,55        0.23^,49
Growth   0.22**,164       0.08,52          0.22*,59         0.34**,53
Sales    0.20**,164       0.27*,52         0.17,59          0.18,53
Labor    -0.31**,150      -0.16,48         -0.27*,54        -0.49**,48
---------------------------------------------------------------
 Each cell has two components: the Pearson r and the n.
---------------------------------------------------------------
+ Perceptual performance on 5 point scale.
Significance: **<0.01, *<0.05, ^=0.1

===============================================================
Table Three --Correlations of Perceptual and Factual Measures   of
Performance
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The overall perceptual measure of firm performance was positively and significantly correlated to all the factual measures of

performance. There was evidence, however, that senior managers of particular functions are tuned into different performance measures. The controller's perceptual performance measure was significantly correlated most strongly with ROA, which is an accounting measure of performance. The CEO's perceptual performance measure was significantly correlated with the measure of size (i.e. sales). This we believe is consistent with the CEO's overall view of the firm and its relative position in the market place. Sales was not correlated with either of the other two managers perceptions of performance. The production manager's perceptual performance was significantly correlated with the measures of labor productivity and throughput growth (i.e. sales growth). This may be due to the production managers daily responsibility for production and efficiency. Overall, the pattern of correlations indicated a tuning into certain performance measures for particular functional managers. Therefore, when concerned with firm performance who you ask about their UIS makes a significant difference. In this data it appears that there is relationship between UIS and firm performance, however, the measure of firm performance is more likely to be one that the manager is tuned into in the course of their responsibilities. A number of possible explanations are posited in section five.

4.3 Findings and Implications

The associations between the managers' UIS and the different measures of firm performance varied by their functional responsibilities. These findings raise a number of important issues.

1) Researchers should be cautious when constructing a firm-wide measure of UIS by combining the individual UIS's as our data finds a low IRR which indicates little shared variance among respondents. Thus the combining of individual measures of UIS into a firm-wide construct is generally not appropriate and may even be misleading.

2) Although each individual's UIS represents a unique view of their computer-based support systems there was significant association with firm performance. Interestingly, firms with better UIS tended to have stronger performance. Causality, however, remains a question for future research. We CANNOT state that higher UIS leads to better firm performance. However this finding poses the question as to the mechanism that creates this relationship between UIS and performance. What is the process that causes this relationship that results in the correlation snapshot we see with this cross-sectional study?

3) It appears that the management responsibility of the respondent

is significant in determining which performance measure was associated with UIS. Many of the significant correlations between UIS and factual measures of firm performance relate to measures that the functional manager would typically be tuned in to in his/her daily duties.

4) Larger firms (as measured by sales) appeared to have CEO's significantly less satisfied with their IT and production managers significantly more satisfied. This is a perplexing result and warrants further investigation. Unfortunately the data collected for this study provides no insight into the potential cause.

5.0 DISCUSSION

This paper did not attempt to establish the causal relationships between UIS and firm performance. To determine causal ordering strong theory and longitudinal studies are necessary. However, UIS was found to have a significant association with firm performance overall -- measured both by factual measures and perceptual measure. Also this relationship was dependant on the responsibilities of the individual manager. Therefore there is a need to further investigate this relationship.

Three possible scenarios are posited to explain the findings of this study:

A) Firms which have better information systems have more satisfied users which report higher UIS scores. The better systems provide more useful information for managers which contribute to better overall firm performance. Individual managers are concerned about particular indicators of firm performance (e.g. controllers and ROA) and rate information systems more highly if they are perceived to help manage and positively influence that particular performance indicator.

This scenario is simplistic. Better information systems cause better performance and UIS is a valid measure of the usefulness of information systems. We do not believe that UIS is likely to "cause" firm performance but rather is associated somehow indirectly with firm performance. To investigate this scenario an in depth study of the process is needed to understand the other factors that mediate the association between UIS and firm performance.

B) A firm which performs better has more funds available to invest in all aspects of the business including information systems. On average, the more funds that are invested in information systems the better the resulting systems and the more satisfied the users thus returning higher UIS scores. Again managers attuned to particular performance indicators will rate more highly information systems they perceive help manage and positively influence those

indicators. To test, a longitudinal study is required with this scenario as the theoretical model and a larger data set than was available for this study.

C) A company which performs better will have associated with it a more positive internal climate. Managers will be content with their position in the market place and content with most of their internal arrangements. These managers of successful companies will be more likely to be satisfied with their information systems and, for example, their strategy, their productivity etc. This scenario is based on the same concept as the "halo affect[4]". Individual managers will concentrate on certain performance indicators and their perceptions of UIS will depend on how the firm is actually performing with respect to their favorite indicators.

It is our belief that the actual relationships which exist are some complex and circular combination of these three simplistic scenarios. Further research is necessary to discover more about these relationships.

6.0 CONCLUSION

The final question that needs to be addressed in the light of these findings is; can UIS be used as a surrogate for system success with

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[4]For a brief description of the "halo effect" in an organizational setting and the evidence supporting this notion see [Organ & Bateman 1986, pp.176].

confidence that a successful system will more likely be associated with superior firm performance? This study revealed a convincing association between UIS and firm performance, however, any of the three scenarios above (and a number of others) could explain these results. In addition, the finding that any relationship between UIS and performance is moderated by the respondent's responsibilities suggests a much more complex relationship. Before deciding on the worth of UIS as an indicator we need to understand the complexities of the relationship. This study does show that UIS is somehow associated with the fundamentally important issues of perceived system success, position of the user, and firm performance.

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APPENDIX A

INSTRUCTIONS for Accountant/Finance Officer/Controller

1. Please answer every question.

2. All answers will be treated as confidential.

3. The questionnaire consists of several sections each with its own set of instructions. Pease read each set of instructions carefully.

4. When you have finished please mail the questionnaire in the envelope provided.

5. Three different questionnaires have been sent to three different people in your firm. All ask for opinions about the computer technology in your firm. Only yours also asks for factual information that will require reference to company records.

Thank you very much for your help. Please remember that it is important that the information be as accurate as possible.

```
SECTION A:    Computer Technology
```

The following questions ask your opinion about the computer based support provided to you.

These questions have a statement followed by a scale. Please answer each question by crossing the scale at the point that best describes your opinion.

An example of the scale positions is presented below.

$$\text{Wealthy} \quad \underline{:\ :\ :\ :\ :\ :\ :} \quad \text{Poor}$$
$$\text{1 2 3 4 5 6 7}$$

1. extremely wealthy   5. slightly poor

2. quite wealthy   6. quite poor

3. slightly wealthy   7. extremely poor

4. neither wealthy or poor

Check in the space, not between spaces. Like this, not this.
:X:_: :_X_:

For example: My vacation in Florida was:

cheap $\underline{:\ :\ :\ :\ :\ :\ :X:}$ expensive

restful $\underline{:\ :X:\ :\ :\ :\ :\ :}$ hectic

The above response means that the person's holiday was extremely expensive and quite restful.

Please answer every question.

1. Relationship with people who provide computer technology support.

dissonant $\underline{:\ :\ :\ :\ :\ :\ :}$ harmonious

bad $\underline{:\ :\ :\ :\ :\ :\ :}$ good

2. Processing of requests for changes to existing systems.

$$\text{fast} : : : : : : : \text{slow}$$

$$\text{untimely} : : : : : : : \text{timely}$$

3. Degree of computer training provided to users.

$$\text{complete} : : : : : : : \text{incomplete}$$

$$\text{low} : : : : : : : \text{high}$$

4. Users' understanding of systems.

$$\text{insufficient} : : : : : : : \text{sufficient}$$

$$\text{complete} : : : : : : : \text{incomplete}$$

5. Users' feeling of participation.

$$\text{positive} : : : : : : : \text{negative}$$

$$\text{insufficient} : : : : : : : \text{sufficient}$$

6. Attitude of people who provide computer support.

$$\text{cooperative} : : : : : : : \text{hostile}$$

$$\text{negative} : : : : : : : \text{positive}$$

7. Reliability of output information.

$$\text{high} : : : : : : : \text{low}$$

$$\text{superior} : : : : : : : \text{inferior}$$

8. Relevancy of output information (to intended function).

$$\text{useful} : : : : : : : \text{useless}$$

$$\text{relevant} : : : : : : : \text{irrelevant}$$

9. Accuracy of output information.

inaccurate : : : : : : : accurate

low : : : : : : : high

10. Precision of output information.

low : : : : : : : high

definite : : : : : : : uncertain

11. Communication with the people who provide computer-based support.

dissonant : : : : : : : harmonious

destructive : : : : : : : productive

12. Time required for new systems development.

unreasonable : : : : : : : reasonable

acceptable : : : : : : : unacceptable

13. Completeness of output information.

sufficient : : : : : : : insufficient

adequate : : : : : : : inadequate

SECTION C: Performance

These questions relate to the performance of your firm and
will request your opinion and the use of financial
statements or other company records.

1. Compared to your closest competitors how do you feel your
   firm performed in 1987?

Very Poorly	Not as Well	About the same	Better	Greatly Superior
:_____	:_____	:_____	:_____	:_____	:

2. How many non-production people did your firm employ in
   recent years? Non-production people are those whose
   work does not involve actually manufacturing salable
   products. e.g. Salespeople, secretaries, managers.

	1984	1985	1986	1987
Non Production people:	_____	_____	_____	_____

3. What was your firm's return on assets in recent years.

Return on assets is calculated by dividing pretax profit by
total assets. Return on assets is often between 10% and 30%.

	1984	1985	1986	1987
Return on assets	_____ %	_____ %	_____ %	_____ %

4. What were the firm's total annual sales in previous
   years?

	1983	1984	1985	1986	1987
Total Sales	$_____	$_____	$_____	$_____	$_____

SECTION E.   Company Details

Now finally some questions about your firm to help us
statistically group all the firms in the study.

1. How many years has your firm used computers on a regular
   basis?

   _____ years

2. How many people did your firm employ in recent years?

	1984	1985	1986	1987
Full time employees	_____	_____	_____	_____
Part time employees	_____	_____	_____	_____

3. What type of products does your firm produce (e.g. Metal
   fasteners or desk lamps)

   _____

4. What is your job title?

   Accountant _____   Finance Officer _____

   Controller _____   Other (please specify)

                             _____

5. Would you say the conditions in your industry in 1987
   were:

   depressed   tough   ok   good   booming

   :_____:_____:_____:_____:_____:

6. If your firm has an information systems (or similar) department, how many people work there?

                Full time employees _____

                Part time employees _____

                No Information Systems Department __

7. Please estimate the number of computer terminals (connected to mini or micro computers) and the number of personal computers in your firm.

        _____   terminals

        _____   personal computers

OPTIONAL

8. Your name and phone number:

       _____

       _____

9. Do you wish to receive a copy of the results of the study?

          yes _____   no _____

THANK YOU VERY MUCH FOR YOUR HELP

Now, please post this form in the envelope provided.

This code is so we can group the three questionnaires from your firm.

       _____FIN