

**EXECUTIVE SUPPORT OF INFORMATION TECHNOLOGY AND INFORMATION SYSTEMS IN  
AUSTRALIAN HOSPITALS:  
AN EMPIRICAL STUDY<sup>16</sup>**

**Graeme Rose**

School of Business  
Charles Sturt University  
Albury NSW 2640 Australia  
grose@csu.edu.au

<http://www.csu.edu.au/faculty/commerce/business/bushp.htm>

**Robert Reeve**

School of Economic and Financial Studies  
Macquarie University  
Sydney NSW 2109 Australia  
reeve@efs.mq.edu.au

<http://www.efs.mq.edu.au/accg/index.html>

### ABSTRACT

Little is known regarding the form executive support should take for the progressive use of information technology and information systems [IT] within organisations. This study applies the theory developed by Jarvenpaa and Ives (1991) who examined two forms of support provided by chief executive officers. These were *executive participation*, a set of IT-related activities, and *executive involvement*, a psychological state reflecting the importance of IT for the organisation's success. Our research, using data obtained from a questionnaire mailed to a sample of Australian hospitals, measures the relationships between these two forms of support and the *progressive use of IT*. Our statistical analysis supports the findings of Jarvenpaa and Ives (1991), who found a stronger relationship between executive involvement and the progressive use of IT. Using Australian hospitals allowed Jarvenpaa and Ives' (1991) theory to be applied in a different environment, increasing its external validity. Firm size was also found to have a positive relationship with the progressive use of IT independent of the two forms of executive support.

### INTRODUCTION

Many writers have identified the link between *information technology and information systems [IT]*, and the improvement of business operations. For instance Rockart and Crescenzi (1984, 3) argue that "... [IT] gives managers an opportunity (1) to improve delivery of their products and service and (2) to potentially increase their effectiveness and productivity in managing the businesses". Despite the benefits to be derived from IT by organisations, many instances can be found in the literature where IT initiatives have been unsuccessful. Table 1 presents a selection of references to problems associated with the *progressive use of IT*. By the progressive use of IT we mean the extent to which progress and continual improvement are made in the identification, development, implementation, management, evaluation of opportunities, and use of information systems and information technology in achieving the goals of Australian hospitals. This meaning is consistent with the way this term was used by Jarvenpaa and Ives (1991).

The difficulties that have been encountered with various aspects of progressive use of IT indicate the need for research aimed at identifying factors that will facilitate successful IT initiatives. The main aim of this study is to assess the relationship between the progressive use of IT and one of these factors, executive support for IT; in particular support for IT by the chief executive officer (CEO). CEOs need to consider the nature and extent of their support for IT. Organisations may have different strategies for achieving their goals. The progressive use of IT is important in all organisations but particularly important in firms with information intensive value chains (Porter & Millar 1985).

---

<sup>16</sup> An earlier version of this paper was presented at the 1996 AAANZ Conference in Christchurch, New Zealand, where constructive comments were received, especially from the discussant Dr. Zahirul Hoque of Griffith University - Gold Coast. Helpful suggestions were also received from one anonymous reviewer. All this assistance is gratefully acknowledged. The authors are grateful to the School of Business and the Faculty of Commerce at Charles Sturt University for providing funds to support this research project.

**TABLE 1: Problems associated with the progressive use of IT**

<b>Date</b>	<b>Problem</b>	<b>Author[s]</b>	<b>Journal</b>
1971	It has long been recognised that SISP [strategic information systems planning] is an intricate and complex activity fraught with problems (p 78).	McFarlan	<i>Harvard Business Review</i>
1976	[studies on the impact of MIS across industries] indicated that current, or planned, computer-based management information systems and their usage fall far short of their theoretical capabilities (p 579).	Schewe	<i>Academy of Management Journal</i>
1985	Top management and MIS directors have been increasingly urged to improve the way in which their information systems development efforts are being managed (p 17).	Doll	<i>MIS Quarterly</i>
1987	Reports abound of systems implemented late and over budget with the anticipated savings being unrealised (p 390)	Lederer & Mendelow	<i>MIS Quarterly</i>
1992	... failure to execute the [SISP] plan is a serious problem ... (p 26).	Lederer & Sethi	<i>Journal of MIS</i>
1993	The track record for [IT] implementation is not very good (p 23).	Benjamin & Levinson	<i>Sloan Management Review</i>

Our study applies the theory developed by Jarvenpaa and Ives (1991) (J&I hereafter) which examines the role played by the CEO in supporting the progressive use of IT. That support provided by top management is a necessary ingredient in the progressive use of IT is well documented (J&I, p 204). However, the appropriate role of CEOs for achieving the progressive use of IT is unclear. Should CEOs personally engage in IT-related management activities such as participation in IT committees, developing IT skills, and keeping abreast of IT developments relevant to their organisations? Alternatively, can CEOs better support IT by maintaining a psychological state in which they communicate to staff the critical importance of IT to the success of the organisation? Our study aims to assess which role has the stronger relationship with the progressive use of IT. By applying J&I's theory in a different setting, our study will make a useful contribution to the literature on the appropriate role of CEOs in the progressive use of IT. Specifically, we expect to show that J&I's theory will apply in a different industry (hospitals), in smaller organisations (J&I's study had been carried out in Fortune 500 firms), in a different country (Australia), and at a different time (1995), thereby increasing its external validity and strengthening our general understanding of executive support for IT. As recommended by J&I (p 220), this study extends their work by also examining the relationship between organisation size and the progressive use of IT.

The remainder of the paper is organised as follows. First J&I's theory is reviewed, and hypotheses are developed to guide the empirical research. Then the methods used in the empirical research are explained and the data analysis is summarised. Finally the results are discussed, and their limitations and implications are considered.

### **THEORY AND DEVELOPMENT OF HYPOTHESES**

The main research question in this study is how CEOs can best support the progressive use of IT in their organisations. In recognising the need to be progressive in the use of IT, CEOs need to communicate their belief in the role to be played by IT effectively. This study compares two ways in which CEOs can do this. Is it more effective for CEOs to take an active hands-on approach in the progressive use of IT, or is it more effective for CEOs to communicate their belief that progressive use of IT is critical for the success of the organisation in other ways?

This study also considers whether organisation size influences the progressive use of IT. Larger hospitals, with their greater input and output diversity, leading to greater uncertainty and a greater need for information (Galbraith 1973, pp 4-5), are expected to make more progressive use of IT than smaller hospitals. Smaller hospitals should be able to be administered with less sophisticated IT more easily than larger hospitals, although it has been shown that higher performing small firms have a higher sophistication of IT (Raymond, Pare & Bergeron, 1995). Larger hospitals are more likely to require sophisticated IT as this may assist the larger and more complex systems such as administration, communication, scheduling, human resource management and

patient care. Merchant (1981, p 815), in commenting on the effect of size, observed that "Larger organizations ... face an exponentially increasing number of channels requiring information flows for coordination purposes ...". To develop an understanding of executive support, J&I built on the theoretical foundations of the user involvement construct developed by Barki and Hartwick (1989). Barki and Hartwick (1989) undertook a review of user involvement as it has been used in IT research and compared this with the way it has been developed in other disciplines. They examined user involvement as applied in IT research, believing that future research should adopt a common definition in line with that used by other disciplines, such as psychology, marketing, and organisational behaviour.

They compared their findings with the way in which involvement has been defined in the literature of these disciplines, and showed that not only are these disciplines undertaking a refinement of the construct, but that they seem to be coming to uniform conclusions (Barki & Hartwick 1989, p 61). They argue that the term *user participation* should be used instead of *user involvement* when referring to the behaviours and activities of the users, and that the term *user involvement* should be used to refer to the user's "...subjective psychological state" (pp 59-60) regarding IT.

J&I used Barki and Hartwick's (1989) framework to examine involvement and participation empirically as forms of executive, rather than user, support. To carry out their examination of executive support, J&I developed empirical measurements for *executive participation* and *executive involvement*, and developed theoretical models to describe the relationships between these factors and the *progressive use of IT*. They then measured the strength of each relationship to identify the more effective form of support role for the CEO and found that

"... the CEO's psychological state about IT appeared to be a more powerful predictor of the firm's progressive use of IT than a CEO's personal participation in IT management." (p 216).

The main research question, which deals with the relative strengths of two sub-sets of executive support is:

Which subset of executive support, *executive participation* (a set of IT-related management activities of the CEO) or *executive involvement* (a psychological state reflecting the degree of importance placed on IT by the CEO) has a stronger relationship with *progressive use of IT* in Australian hospitals?

The secondary research question is:

Is there a relationship between *organisation size* and the *progressive use of IT* within Australian hospitals?

Hospitals have a value chain of relatively high information intensity (Porter & Millar 1985) and are therefore a suitable context for this analysis. The choice of Australian hospitals as an industry of high information intensity is supported by Johnston and Carrico (1988). They identified three industry factors that significantly influence the likelihood of strategic IT potential, and based their analysis on the operation of the value chain as developed by Porter (1985, p 39). The industry factors identified were said to arise from the nature of the primary products and services and the structure of the processes that are used to produce value. The three factors influencing strategic IT potential as identified by Johnston and Carrico (1988) are significant information content in key relationships (pp 39-40), products or services that have limited life (p 40) and increased competitive pressure within the industry (pp 40-41). These factors all apply in the hospital industry in Australia.

The dependent variable in this study is the *progressive use of IT* in Australian hospitals. Other writers have considered similar concepts. Boynton and Zmud (1987, pp 59-60), for example, referred to "information technology managerial efforts" which involved planning, organising, controlling and directing the introduction of IT within an organisation. Organisations can therefore be progressive in use of IT with acquisition of hardware and software, implementation of IT systems and undertaking strategic IT planning. *Progressive use of IT* in Australian hospitals was designated as *PROGIT* and defined as:

The extent to which progress and continual improvement are made in the identification, development, implementation, management, evaluation of opportunities, and use of information systems and information technology in achieving the goals of Australian hospitals.

The main independent variables in this study are *executive participation* and *executive involvement*. *Executive participation* is defined as the CEO's activities or substantive personal interventions in the management of IT within the hospital and *executive involvement* is defined as the psychological state of the CEO regarding IT, reflecting the degree to which the CEO views IT as being critical for the hospital's success. *Organisation size* is defined as the size of the hospital in terms of number of maintained beds.

*Executive participation* is defined as personal engagement in IT-related management activities such as membership IT committees, developing IT skills and keeping abreast of IT developments relevant to their organisations. This entails the CEO's investment in time and energy in IT-related matters and would be expected to contribute to the progressive use of IT within an organisation. This leads to Hypothesis One:

H1: There will be a positive relationship between *executive participation* and *PROGIT*.

*Executive involvement* refers to the psychological state of the CEO regarding IT, reflecting the degree to which the CEO views IT as critical to an organisation's success and the way in which he or she communicates its importance to staff. This is expected to contribute to the progressive use of IT within an organisation. This leads to Hypothesis Two:

H2: There will be a positive relationship between *executive involvement* and *PROGIT*.

Based on J&I's findings it is expected that the *executive involvement* factor would influence the progressive use of IT more strongly than the *executive participation* factor. This leads to Hypothesis Three:

H3: The relationship between *executive involvement* and *PROGIT* will be stronger than the relationship between *executive participation* and *PROGIT*.

**FIGURE 1: The relationships between executive participation, executive involvement, organisation size and PROGIT**

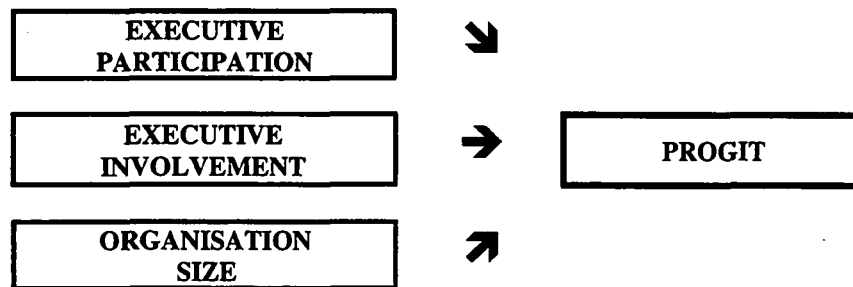


Figure 1 shows the relationships between *executive participation*, *executive involvement* and *PROGIT*, taking into account the relationship between *organisation size* and *PROGIT*. It is hypothesised that, after allowing for the effects of executive participation and executive involvement, larger hospitals would be more likely to be progressive in the use of IT than smaller hospitals. This leads to Hypothesis Four:

H4: There will be a positive relationship between *organisation size* and *PROGIT*, after controlling for the effects of *executive participation* and *executive involvement*.

Finally it is hypothesised that the relationship between *executive participation* and the progressive use of IT, and the relationship between *executive involvement* and the progressive use of IT, would be independent effects and would not be moderated by *organisation size*. This leads to Hypothesis Five:

H5: *Organisation size* will not moderate the relationship between *executive participation* and *PROGIT*, or between *executive involvement* and *PROGIT*.

## RESEARCH METHOD

Data were collected through a mailed questionnaire addressed to CEOs and senior information technology managers (SITMs) in 236 Australian hospitals. These hospitals were randomly selected from the 1994 edition of Isaacson's year book of Australian hospitals. The sample was selected from both public and private Australian hospitals whose size was listed as greater than 100 maintained beds.

Cohen and Cohen's (1983) procedure was used for determining the required sample size. Using multiple regression with the significance criterion ( $\alpha$ ) set at the conventional 95% level, the desired power for the *F*-test set at 0.80, 5 regressors, and an expected  $R^2$  of 0.16 (the smallest variance explained in J&I's study), a sample size of 74 useable responses was required. J&I's study produced response rates from CEOs of 45%. Allowing

for a response rate of around 40%, this indicated that at least 155 survey forms should be mailed. Survey forms were mailed to 236 Australian hospitals in order to minimise the need for follow-up procedures. Eighty-four useable responses were received; a response rate of 35.6%.

Two survey forms were sent to the CEO of each hospital in the sample using the title for that person as identified in Isaacson (1994). One was to be completed by the CEO, and the other (similar) survey form was to be completed by the senior information technology manager (SITM). Appendix A contains a copy of the survey form sent to SITMs, the responses to which provided most of the data for this study. The form sent to CEOs is similar and is available from the authors. Both were mailed to the CEO with a covering letter asking that the envelope containing the covering letter and survey form for the SITM be forwarded to the relevant person. Stamped addressed return envelopes were included for both the CEO and the SITM to preserve the confidentiality of each respondent.

A single question, developed by J&I, was used to measure PROGIT. Respondents were asked "How would you describe your hospital's use of IT (information technology and information systems)? They were asked to choose from the following range of responses:

- a leading hospital
- close follower
- middle of the pack
- somewhat behind
- laggard

Although subjective in nature this measure was found to have convergent validity with at least one objective measure of this variable (J&I, p 351). Also, Dess and Robinson (1984) found that firms' relative performance within an industry can be appropriate substitutes for objective performance measures. J&I (p 213) experienced demand syndrome in the responses submitted by the CEOs. That is, CEOs appeared to have responded in the way they thought the researchers, their IT managers, or others, expected them to answer. Analysis of the responses from CEOs of Australian hospitals revealed the likely existence of demand syndrome. Therefore the average of the CEOs' and the SITMs' responses to this question were used as the score for this variable.

*Organisation size* was measured by taking the average of the CEOs' and the SITMs' responses regarding the number of maintained beds in the hospital.

*Executive participation* and *executive involvement* were measured with multi-item scales. The ten items used were adapted from J&I, and were reverse-coded and re-coded to a 5 point scale where appropriate. Each of the items used to measure *executive participation* tapped into the IT-related activities of the CEO as reported by the SITM. Each of the items used to measure *executive involvement* tapped into the CEOs' prevailing thinking about IT as reported by the SITMs.

Table 2 contains a varimax rotated factor matrix for the ten items included in the factor analysis. Inspection of Table 2 reveals that Factor 2 contains four items with loadings above .40. These were the four items that made up J&I's measure of *executive involvement*. Factor 1 also contains four items with loadings above .40. These four items were included in J&I's measure of *executive participation*. Factor 3 contains two items with loadings above .40. These two items were also included in J&I's measure of *executive participation* but, based on the data collected in this study, were not unidimensional with the four *executive participation* items in Factor 1 and were dropped.

Deletion of items 5 and 6 from the *executive participation* scale can be further justified as follows. The question identifying the number of levels between the SITM and the CEO does not necessarily measure the IT-related management activities of the CEO. Where the number of levels between the CEO and the SITM is low, the IT-related management activities will not necessarily be high, nor would the converse necessarily be true. The question relating to the CEO's role in the hospital steering committee is also problematic. The low end of the scale required the respondent to indicate that no steering committee exists. The high end of the scale required the respondent to indicate that the CEO is the defacto steering committee. At both ends of the scale, therefore, no steering committee exists.

The multi-item scales developed for *executive participation* and *executive involvement* were tested for internal consistency reliability using Cronbach's (1951) alpha. The four-item *executive participation* scale returned an alpha value of .76 and the four-item *executive involvement* scale returned an alpha value of .58. These values of alpha are considered acceptable for exploratory research (Nunnally, 1967).

**TABLE 2: Varimax rotated factor matrix for the ten items used to measure executive participation and executive involvement**

Factor	Question	Factor 1	Factor 2	Factor 3
CEO's personal participation in firm's use of IT	Part III, Question 2	.788	.037	.108
CEO's informal contacts with IT management	Part III, Question 3	.562	.061	.523
CEO's knowledge of IT opportunities	Part III, Question 4	.817	.317	-.043
CEO's knowledge of other hospitals' use of IT	Part III, Question 5	.778	.178	-.058
Number of levels between SITM and CEO	Part II, Question 2	.143	-.015	.659
CEO's role in corporate IT steering committee	Part III, Question 8	.203	-.047	-.761
CEO's perception of the importance of IT	Part III, Question 1	.351	.673	-.026
CEO's prevailing thinking about IT spending	Part III, Question 6	.178	.533	.261
CEO's endorsement of IT not meeting traditional criteria	Part III, Question 7	-.011	.690	-.047
CEO's vision for IT	Part III, Question 9	.106	.776	.012
<b>Eigenvalue</b>		<b>3.137</b>	<b>1.392</b>	<b>1.247</b>
<b>Variance explained</b>		<b>31.4%</b>	<b>13.9%</b>	<b>12.5%</b>

### DATA ANALYSIS AND RESULTS

Table 3 contains a summary of descriptive statistics for the variables used in this study. Frequency histograms of the four continuous variables were prepared with normal curves superimposed. Inspection of these revealed that all had approximately normal distributions except for *organisation size*, which was positively skewed. A square root transformation of this variable was undertaken which resulted in an approximately normal distribution.

**TABLE 3: Summary of descriptive statistics [N=84]**

Variable Name	Mean	Standard Deviation	Minimum Possible Actual	Maximum Possible Actual
PROGIT	3.262	.883	1 1.50	5 5.00
EXECUTIVE PARTICIPATION [4-item scale] X <sub>1</sub>	3.161	.719	1 1.75	5 4.50
EXECUTIVE INVOLVEMENT [4-item scale] X <sub>2</sub>	3.321	.814	1 1.20	5 5.00
ORGANISATION SIZE X <sub>3A</sub>	199.98	157.63	n/a 40	n/a 925

Table 4 contains a summary of the correlations between the variables. In each cell the top line shows Pearson's  $r$ , and the second line shows the associated level of significance (two-tailed  $p$ -value).

TABLE 4: Correlation matrix [N=84]

	PROGIT	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	X <sub>3A</sub>
PROGIT	1.00	.115 <i>p</i> =.296	.389 <i>p</i> =.001	.189 <i>p</i> =.084	.169 <i>p</i> =.124
EXECUTIVE PARTICIPATION [4 ITEM SCALE] X <sub>1</sub>		1.00	.376 <i>p</i> =.001	-.098 <i>p</i> =.371	-.065 <i>p</i> =.554
EXECUTIVE INVOLVEMENT X <sub>2</sub>			1.00	-.043 <i>p</i> =.002	-.034 <i>p</i> =.192
ORGANISATION SIZE [SQUARE ROOT TRANS] X <sub>3</sub>				1.00	.984 <i>p</i> =.001
ORGANISATION SIZE X <sub>3A</sub>					1.00

Regression 1 shows the simple regression model developed to test Hypothesis One.

$$\text{PROGIT} = \beta_0 + \beta_1 X_1 + E_i \quad \text{Regression 1}$$

Regression 2 shows the simple regression model developed to test Hypothesis Two.

$$\text{PROGIT} = \beta_0 + \beta_2 X_2 + E_i \quad \text{Regression 2}$$

Regression 3 shows the multiple regression model developed to test Hypothesis Three.

$$\text{PROGIT} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + E_i \quad \text{Regression 3}$$

Regression 4 shows the multiple regression model developed to test Hypothesis Four.

$$\text{PROGIT} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + E_i \quad \text{Regression 4}$$

Regression 5 shows the moderated multiple regression model developed to test Hypothesis Five.

$$\text{PROGIT} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_1 X_3 + \beta_5 X_2 X_3 + E_i \quad \text{Regression 5}$$

In all the regression analyses the following terms are used:

$\beta_0$	=	Intercept (constant)
$X_1$	=	Executive participation [revised 4 item scale]
$X_2$	=	Executive involvement
$X_3$	=	Organisation size [square root transformation]
$X_1 X_3$	=	Product of $X_1$ $X_3$
$X_2 X_3$	=	Product of $X_2$ $X_3$
$E_i$	=	Residual (error)

Table 5 summarises the results of the simple regression analyses of *executive participation* and *executive involvement* on *PROGIT*.

**TABLE 5:** Results of simple regression analyses of executive participation and executive involvement on *PROGIT* [ $N=84$ ]

	REGRESSION 1 $PROGIT = \beta_0 + \beta_1 X_1 + E_i$	REGRESSION 2 $PROGIT = \beta_0 + \beta_2 X_2 + E_i$
$R^2$	0.013	0.151
Adjusted $R^2$	0.001	0.141
$F$	1.108	14.691
Significance of $F$	0.295	0.001
$\beta$	0.141	0.422
Beta	0.115	0.389
$t$	1.053	3.833
Significance of $t$	0.295	0.001

Table 6 summarises the results of Regression 3, the multiple regression analysis of both *executive participation* and *executive involvement* on *PROGIT*.

**TABLE 6:** Results of multiple regression analysis of executive participation and executive involvement on *PROGIT* [ $N=84$ ]

REGRESSION 3 $PROGIT = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + E_i$				
Variable name	$\beta$	Beta	$t$	Significance of $t$
EXECUTIVE PARTICIPATION $X_1$	-.044	-.036	-.329	.743
EXECUTIVE INVOLVEMENT $X_2$	.437	.403	3.656	.001
	$R^2$	Adjusted $R^2$	$F$	Significance of $F$
	0.153	0.132	7.320	0.001

Hypothesis One predicted a positive relationship between *executive participation* and *PROGIT*. That is, the more that a CEO participated in IT related activities the more progressive use of IT would be in that hospital. Inspection of Regression 1 in Table 5 shows that *executive participation* has a beta of 0.115 at the 0.295 level of significance and explains only 1.3% of the variance ( $R^2 = 0.013$ ) in *PROGIT*. This provides no support for Hypothesis One. This was confirmed in the analysis in Table 6 showing the results of Regression 3 (the multiple regression analysis) where the beta for *executive participation* is -0.036 at a level of significance of 0.743, when the effect of *executive involvement* on *PROGIT* is taken into account.

Hypothesis Two predicted a positive relationship between *executive involvement* and *PROGIT*. That is, the more that a CEO reflected the importance placed on IT the more progressive the use of IT would be in that hospital. Inspection of Regression 2 in Table 5 shows *executive involvement* has a beta of 0.389 at the 0.001 level of significance and explained 15.1% of the variance ( $R^2 = 0.151$ ) in *PROGIT*. This provides strong support for Hypothesis Two. This was confirmed in the analysis in Table 6 showing the results of Regression 3 (the multiple regression analysis) which shows a beta for *executive involvement* of 0.403 at a level of significance of 0.001, when the effect of *executive participation* on *PROGIT* is taken into account.

Hypothesis Three predicted that the relationship between *executive involvement* and *PROGIT* would be stronger than the relationship between *executive participation* and *PROGIT*. This could be tested formally by estimating whether a significant difference exists between the two correlation coefficients. This procedure is unnecessary as, from the regression analyses in Tables 4 and 5, it can be seen that the relationship between *executive involvement* and *PROGIT* is positive and significant, but the relationship between *executive participation* and *PROGIT* is not significant. This provides strong support for Hypothesis Three.



Table 7 summarises the results of Regression 4, the multiple regression analysis of *executive participation*, *executive involvement*, and *organisation size*, on *PROGIT*.

**TABLE 7: Results of multiple regression analysis of executive participation, executive involvement, and organisation size, on PROGIT [N=84]**

REGRESSION 4				
PROGIT = $\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + E_i$				
Variable name	$\beta$	Beta	$t$	Significance of $t$
EXECUTIVE PARTICIPATION $X_1$	-.020	-.016	-.151	.880
EXECUTIVE INVOLVEMENT $X_2$	.438	.404	3.739	.001
ORGANISATION SIZE $X_3$	.038	.205	2.039	.044
	$R^2$	Adjusted $R^2$	$F$	Significance of $F$
	0.194	0.164	6.456	0.001

Hypothesis Four predicted a positive relationship between *organisation size* and *PROGIT*, after controlling for the effects of *executive participation* and *executive involvement*. That is, the larger the hospital the more progressive the use of IT in that hospital, regardless of the level of *executive participation* and *executive involvement*. Inspection of Regression 4 in Table 7 shows *organisation size* has a beta of 0.205 at the 0.044 level of significance, providing strong support for Hypothesis Four.

Table 8 summarises the results of Regression 5, the moderated multiple regression analysis of *executive participation*, *executive involvement*, and *organisation size*, on *PROGIT*.

Hypothesis Five predicted that *organisation size* would not moderate the relationship between *executive participation* and *PROGIT*, or between *executive involvement* and *PROGIT*. That is, the relationship between *executive participation* and *PROGIT*, and the relationship between *executive involvement* and *PROGIT*, would be independent of the relationship between *organisation size* and *PROGIT*. To test this hypothesis Regression 5 was developed which contains product terms containing the interactions between *organisation size*, *executive participation* and *PROGIT* [ $X_1X_3$ ] and *organisation size*, *executive involvement* and *PROGIT* [ $X_2X_3$ ] (Jaccard, Turrisi & Wan, 1990). Inspection of Regression 5 in Table 8 shows that the coefficients of both of these product terms are not significant. This provides strong support for Hypothesis Five.

TABLE 8: Results of moderated multiple regression analysis of executive participation, executive involvement, and organisation size, on PROGIT [N=84]

REGRESSION 5				
PROGIT = $\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_1 X_3 + E_i$				
Variable name	$\beta$	Beta	$t$	Significance of $t$
EXECUTIVE PARTICIPATION $X_1$	.033	.027	.074	.941
EXECUTIVE INVOLVEMENT $X_2$	.776	.715	1.757	.082
ORGANISATION SIZE $X_3$	.129	.682	1.523	.131
PRODUCT TERM $X_1 X_3$	-.003	-.072	-.108	.914
PRODUCT TERM $X_2 X_3$	-.023	-.517	-.757	.451
	$R^2$	Adjusted $R^2$	$F$	Significance of $F$
	0.208	0.158	4.119	0.002

#### DISCUSSION AND CONCLUSIONS

Table 9 contains a summary of the simple regression analyses of the relationships between *executive participation* and *PROGIT*, and between *executive involvement* and *PROGIT* in both the J&I study and this study.

TABLE 9: Comparative results of simple regression analyses: Australian hospitals and Jarvenpaa & Ives (1991)

		Executive Participation	Executive Involvement
Beta	Australian hospitals	0.11	0.38
	Jarvenpaa and Ives (1991)	0.49	0.46
F-statistic	Australian hospitals	1.10	14.69
	Jarvenpaa and Ives (1991)	10.54	22.02
Significance of F	Australian hospitals	0.29	<0.01
	Jarvenpaa and Ives (1991)	<0.05	<0.01
$R^2$	Australian hospitals	0.01	0.15
	Jarvenpaa and Ives (1991)	0.16	0.32

The results in Table 9 show that *executive involvement* has a statistically significant relationship with *PROGIT* in both research environments. J&I found *executive participation* to have a statistically significant relationship with *PROGIT*, but this study found that no statistical significance can be attributed to the relationship for Australian hospitals. In both research environments *executive involvement* was found to have a stronger relationship with *PROGIT* than did *executive participation*. This finding supports the first two hypotheses developed by J&I (1991) and also supports the recommendations of Barki and Hartwick (1989). These findings indicate that a CEO's psychological state concerning the importance of IT for the success of the organisation (*executive involvement*) is a better predictor of the progressive use of IT (*PROGIT*) in the organisation than IT-related

management activities (*executive participation*). In practical terms, it is better for CEOs to communicate their view of the importance of IT for an organisation's success than to engage in IT-related management activities.

Consideration is now given to the weak results for *executive participation* in the study of Australian hospitals. There are two possible explanations for this phenomenon. Firstly, it is possible that the IT-related activities of CEOs do have no effect on the progressive use of IT within an organisation. This is an unlikely alternative given the strong relationship identified by J&I. A better explanation is that CEOs in Australian hospitals behave differently to CEOs in the large private sector firms surveyed by J&I. For instance CEOs in Australian hospitals may not have the same level of IT exposure or training or do not feel comfortable with IT and hesitate to support it. It is also possible that the low importance of the CEO's participation in hospitals may be due to the high importance of doctors for whom the participation is crucial to the effective implementation of IT.

The hypothesis that larger hospitals would be more progressive in their use of IT than smaller hospitals was confirmed. As size increases, so does the level of sophistication of systems necessary for efficient and effective operations. The administrative systems in small hospitals need only be operated manually. They would not necessarily require payroll, patient records or communications systems to be computerised. Larger hospitals would be more likely to justify the use of computerised systems in terms of cost/benefit analyses, and would benefit from the production of information in a timely manner for purposes of external reporting, internal decision-making, and communicating. Progressive use of IT would produce economies of scale whereby complex IT would be justified on the basis of the increased complexity of systems that arise from the size of the organisation.

CEOs need to identify the best way of promoting the progressive use of IT in their organisations. CEOs have ultimate responsibility for the performance of their organisations, and if they are to operate efficiently and effectively they need to take advantage of the benefits offered by IT. However their time is scarce and valuable. They need to identify the most appropriate and effective way of supporting the progressive use of IT within their organisations. The research in this study supported the findings of J&I that it is more appropriate for CEOs to communicate their belief in the importance of IT for the success of the organisation than to actively participate in IT-related management activities. This finding could come as a pleasant surprise to CEOs who do not feel comfortable with the developing technology, even though they do understand its importance. The message to these CEOs is that they do not necessarily need to engage in IT-related activities. Instead, they can communicate their perception of the value of IT in other ways. The findings in this study suggest that the most crucial aspect of this communication is the psychological support that CEOs are able to provide to the organisation. That is, it will be enough for CEOs to communicate their commitment and support for such projects, rather than becoming personally active in an area in which they may have little expertise.

Although this study provides support for the recommendations made by Barki and Hartwick (1989, 59-60), and for the generalisability of the findings of J&I (p 219), it is necessary to continue to explore the conditions and mechanisms governing the effects of participation and involvement on the progressive use of IT. Research focusing on the support provided by the CEO of a single hospital could provide useful insights. Measures of the form and value of the support provided by the CEO as identified by other members of the hospital organisation would be also be valuable, particularly considering the demand syndrome demonstrated by CEOs.

J&I (p 219) also recommend that attention be given to better measures of the progressive use of IT, and further suggest that individual level factors such as decision-making style and leadership style be brought in to future research. We suggest that additional organisational-level variables, such as ownership mode (public or private), and in the case of hospitals the method of funding, be included in future research. For instance, are private hospitals, being more strongly influenced by the need to recover costs, more likely to be involved in the progressive use of IT? Because casemix funding formulae rely upon the operation of sophisticated information gathering, storage, and analysis techniques a further question arises. That is, are hospitals that are funded using a casemix funding formula likely to be more progressive in their use of IT than hospitals that derive their funds from the more traditional, historically-based budget allocation methods?

## REFERENCES

- Barki, H. & Hartwick, J. (1989) "Rethinking the Concept of User Involvement", *MIS Quarterly*, 13(1), pp 53-64.
- Benjamin, R.I. & Levinson, E. (1993) "A Framework for Managing IT-enabled Change", *Sloan Management Review*, Summer, pp 23-33.
- Boynton, A.C. & Zmud, R.W. (1987) "Information Technology Planning in the 1990's: Directions for practice and research", *MIS Quarterly*, 11(1), pp 59-71.
- de Vaus, D.A. (1991) *Surveys in Social Research*, Sydney: Allen & Unwin.
- Cohen, J. & Cohen, P. (1983) *Applied Multiple Regression/correlation Analysis for the Behavioral Sciences*, Second Edition, Hillsdale, New Jersey: Lawrence Erlbaum Associates.
- Cronbach, L.J. (1951) "Coefficient Alpha and the Internal Structure of Tests", *Psychometrika*, 16, pp 297-334.
- Dess, G.G. & Robinson, R.B. (1984) "Measuring Organizational Performance in the Absence of Objective Measures: The Case of the Privately-held Firm and Conglomerate Business Unit", *Strategic Management Journal*, 5, pp 265-273.
- Doll, W. (1985) "Avenues for Top Management Involvement in Successful MIS Development", *MIS Quarterly*, 9(1), pp 17-35.
- Galbraith, J.R. (1973) *Designing Complex Organisations*, Reading, Massachusetts: Addison-Wesley.
- Isaacson, P. (1994) *Hospital and Health Services Year Book (18th Edition)*, Prahran, Victoria: Peter Isaacson Publications.
- Jaccard, J., Turrisi, R. & Wan, C. (1990) *Interaction Effects in Multiple Regression*, Newbury Park, California: Sage Publications.
- Jarvenpaa, S.L. & Ives, B. (1991) "Executive Involvement and Participation in the Management of Information Technology", *MIS Quarterly*, 15(2), pp 204-227.
- Johnston, H.R. & Carrico, S.R. (1988) "Developing Capabilities to Use Information Strategically", *MIS Quarterly*, 12(1), pp 37-48.
- Lederer, A.L. & Mendelow, A.L. (1987) "Information Resource Planning: Overcoming Difficulties in Identifying Top Management Objectives", *MIS Quarterly*, 11(3), pp 389-399.
- Lederer, A.L. & Sethi, V. (1992) "Root Causes of Strategic Information Systems Planning Implementation Problems", *Journal of Management Information Systems*, 9(1), pp 25-45.
- McFarlan, F.W. (1971) "Problems in Planning the Information System", *Harvard Business Review*, 49(2), pp 75-89.
- Merchant, K. (1981) "The Design of the Corporate Budgeting System: Influences on Managerial Behaviour and Performance", *The Accounting Review*, 56(4), pp 813-826.
- Norusis, M.J. & SPSS Inc. (1993) *SPSS® for Windows™: Base system user's guide*, Chicago, Illinois: SPSS Inc.
- Nunnally, J.C. (1967) *Psychometric Theory*, McGraw Hill, New York.
- Porter, M.E. (1985) *Competitive Advantage*, London: The Free Press.
- Porter, M.E. & Millar, V.E. (1985) "How Information Gives You Competitive Advantage", *Harvard Business Review*, 63 (4), pp 149-160.
- Raymond, L., Pare, G. & Bergeron, F. (1995) "Matching Information Technology and Organizational Structure: An Empirical Study with Implications for Performance", *European Journal of Information Systems*, 4, pp 3-16.
- Rockart, J. F. & Crescenzi, A. D. (1984) "Engaging Top Management in Information Technology", *Sloan Management Review*, Summer, pp 3-16.
- Schewe, C.D. (1976) "The MIS user: An Exploratory Behavioural Analysis", *Academy of Management Journal*, 19(4), pp 577-590.

## APPENDIX

## SENIOR IT MANAGER SURVEY FORM

Thank you for agreeing to provide information for our research project. This survey form is to be completed by the senior IT manager. It has been designed to collect information about your hospital and about the role your CEO plays in the use of information technology and information systems (IT) within your hospital, and contains nineteen questions.

The survey form is designed to be completed in around ten (10) minutes, to ensure that not too much of your time is taken. Nevertheless, the information you provide is important in assessing the role your CEO plays with respect to IT within your hospital, and we ask that you give it careful consideration.

On completion could you please return the survey form to us by post using the enclosed stamped addressed envelope.

**Section I:** asks about your hospital.

**Section II:** asks about your organisational status as senior IT manager within the hospital.

**Section III:** asks about the approach your CEO takes to IT within your hospital.

For each of the following questions you are asked to circle the number representing the *most appropriate* response.

## SECTION I Hospital Profile

1. What is the size of your hospital?  
(approximate number of maintained beds)

Optional Comment: \_\_\_\_\_

2. What is the proportion of funds received by your hospital from a casemix formula?

5	4	3	2	1
mostly all	more than half	about half	less than half	very small

3. State the estimated proportion of funds received via casemix formula.

4. How would you describe your hospital's use of IT (information technology and information systems)?

5	4	3	2	1
a leading hospital	close follower	middle of the pack	somewhat behind	laggard

Optional Comment: \_\_\_\_\_

5. Is your hospital a private hospital or a public hospital?

## SECTION II Your organisational status as the senior IT manager

1. What is the title of the person to whom you report?

\_\_\_\_\_

2. How many *levels* in the organisation hierarchy are you from the CEO?

1	2	3	4	5	6
---	---	---	---	---	---

3. Do you have an IT, administration or other (eg. medical) training?

1	2	3
<b>IT training only</b>	<b>Administration training</b>	<b>Other training [specify below]</b>

Other training [please specify]

---

4. For how many *years* have you served as a senior IT manager?

1	2	3	4	5	More than 5
---	---	---	---	---	-------------

5. For how many *years* have you served as a senior IT manager in this hospital?

1	2	3	4	5	More than 5
---	---	---	---	---	-------------

**SECTION III Chief executive officer [CEO] characteristics**

1. Which of the following statements best describes the importance that your CEO perceives IT (information technology and information systems) to be for your hospital?

6	5	4	3	2	1
<b>Considers IT as the single most critical factor for the hospital</b>	<b>Considers IT as one of the vital parts of the competitive strategy</b>	<b>Considers IT to be vital for smooth functioning of operations</b>	<b>Considers IT to be one of the many ways to cut costs in the hospital</b>	<b>Considers IT to be the concern of technologists, not managers, although is supportive of IT</b>	<b>Has little concern for the potential utility of IT</b>

Optional Comment: \_\_\_\_\_

---

2. How often does your CEO get personally involved in matters related to the use of IT within your hospital?

5	4	3	2	1
<b>daily</b>	<b>weekly</b>	<b>monthly</b>	<b>few times a year</b>	<b>less than once a year</b>

Optional Comment: \_\_\_\_\_

---

3. How frequent are informal contacts between the CEO and the hospital's senior IT management?

5	4	3	2	1
<b>daily</b>	<b>weekly</b>	<b>monthly</b>	<b>few times a year</b>	<b>less than once a year</b>

Optional Comment: \_\_\_\_\_

---

4. How knowledgeable is the CEO about IT opportunities and possibilities for your hospital?

5	4	3	2	1
<b>extremely knowledgeable</b>	<b>very informed</b>	<b>well informed</b>	<b>somewhat informed</b>	<b>weakly informed</b>

Optional Comment: \_\_\_\_\_  
 \_\_\_\_\_

5. How knowledgeable is the CEO about IT innovations that have been developed by other hospitals?

5	4	3	2	1
<b>extremely knowledgeable</b>	<b>very informed</b>	<b>well informed</b>	<b>somewhat informed</b>	<b>weakly informed</b>

Optional Comment: \_\_\_\_\_  
 \_\_\_\_\_

6. Which of the following best describes the CEO's prevailing thinking about funds the hospital spends on IT?

3	2	1
<b>Views IT as an expense to be controlled</b>	<b>Views IT as a resource to be allocated fairly across organisational units</b>	<b>Views IT as a strategic investment</b>

Optional Comment: \_\_\_\_\_  
 \_\_\_\_\_

7. How often does your CEO endorse major IT investments that have not been endorsed by traditional justification criteria and procedures?

3	2	1
<b>rarely</b>	<b>occasionally</b>	<b>frequently</b>

Optional Comment: \_\_\_\_\_  
 \_\_\_\_\_

8. Which of the following best describes the CEO's role in the hospital IT steering committee?

5	4	3	2	1
<b>is the defacto steering committee</b>	<b>chairs an IT committee and actively participate in meetings</b>	<b>is a member of the IT steering committee</b>	<b>IT committee exists, but with minimal input or awareness from the CEO</b>	<b>no steering committee exists</b>

Optional Comment: \_\_\_\_\_  
 \_\_\_\_\_

9. What is your CEO's vision for IT?

4	3	2	1
<b>a strong, but generic vision</b> <i>("we will be the leader in hospital use of advanced IT")</i>	<b>a technical vision of how the hospital will use IT</b> <i>("we will install a database that keeps track of all patients")</i>	<b>a functional vision of how the hospital will use IT</b> <i>("95% of patient information will be correctly coded")</i>	<b>no vision for IT</b>

Optional Comment: \_\_\_\_\_  
 \_\_\_\_\_

Thank you for completing this survey form. Please return it in the attached stamped addressed envelope. Write your name and address on the back of the envelope if you would like a copy of the findings of this research project.