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December 2003

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Abstract

The organisational benefits of business managers' involvement in IT management activities are well documented. However, little relevant research has been reported. Building on the IT competencies model proposed by Bassellier, Reich and Benbasat (2001), a questionnaire was developed and empirically tested to assess the level of information technology (IT) competence of 83 business managers in small and medium-size Tasmanian firms. The findings report that the overall extent of IT competence in small Tasmanian firms is relatively high although the level varies across the different dimensions of IT competency. Influencing factors include organisation size, age, job level and work experience. It is hoped that the findings will assist organisations develop strategies to enhance the IT competence profile of their business personnel with a view to improving the competitive position and overall success of the firm.

Keywords

IT competence, competence, SME, small to medium sized enterprises, Australia, business managers, alignment, instrument, measurement.

Introduction

The potential of information technology to provide business value, sustain competitive advantage and enable novel and adaptive organisational forms is well recognized in the IS academic and practitioner communities (Sambamurthy & Zmud, 1997; Venkatraman, 1991; Rockart & Short, 1991). Unfortunately, a 'cultural gap' exists between the information systems organisation and the business organisation (Schein, 1992; Ward & Peppard, 1996). This gap can adversely affected the competitive advantage of an organisation particularly if it is in an information-intensive industry or depends heavily on IT-based systems (Peppard, 2001). One way this relationship can be enhanced is by a cross fertilisation of knowledge between IT personnel and their internal and external business partners to cultivate and maintain a partnership between the two entities. Some have tried to divorce themselves from this relationship by outsourcing, however, this only partially eliminates the problem in that there is still a need for business managers to understand IT-related procedures and strategies in order to most effectively choose and deploy outsourcing relationships. Sambamurthy and Zmud (1997) developed seven categories of IT management competencies during a four-year

programme of research and their empirical data shows a direct relationship between IT competency and organisational success. More recently, Bassellier, Reich and Benbasat (2001) developed a model of IT competency based on previous literature and discussions with IS professionals and CIOs. This study attempts to develop a questionnaire to measure IT competency based on Bassellier's et al. (2001) model and test it on a group of business managers in small to medium firms in regional Australia, to answer two research questions:

1. To what extent are Tasmanian business managers IT competent?
2. What factors influence their level of IT competency?

Relevant Research

Information Technology Competence

IT competence is a more specific form of the competence construct that has emerged in the psychology, education and management disciplines. Davern (1996) describes IT 'competence' as a "skill that links employee skills with job requirements" others have described it as a personality trait which includes an emotional component (Haynes, 1979) and as knowledge (Gartner Group, 1999).

Recently, Bassellier, et al. (2001), expanded the construct of IT competence to include not only skills, but also these emotional and knowledge components and suggest that it has two main dimensions: explicit and tacit knowledge.

Explicit knowledge is formal knowledge that can be taught, read or explained. Components of explicit IT knowledge include technological skills, knowledge of applications including appropriate use and a competence of systems development processes and issues. Other components are vocabulary and skills required to communicate between all related industry areas and access further knowledge sources, either people or material resources when further knowledge is required (Bassellier et al, 2001).

Tacit knowledge is gained with experience. Experience increases memory of how to undertake an activity, which in turn increases competency levels in relation to that experience. The combination of variety and intensity of the experiences influence the level of tacit knowledge (Bassellier et al, 2001). When the knowledge is gained through internalised learning it starts as explicit knowledge and can latter be turned into tacit knowledge.

Figure 1 displays the model of IT competence proposed by Bassellier, et al. (2001). It decomposes *explicit knowledge* into four sub-dimensions: technology, applications, systems development and IT knowledge acquisition and *tacit knowledge* in two sub-dimensions: experience and cognition.

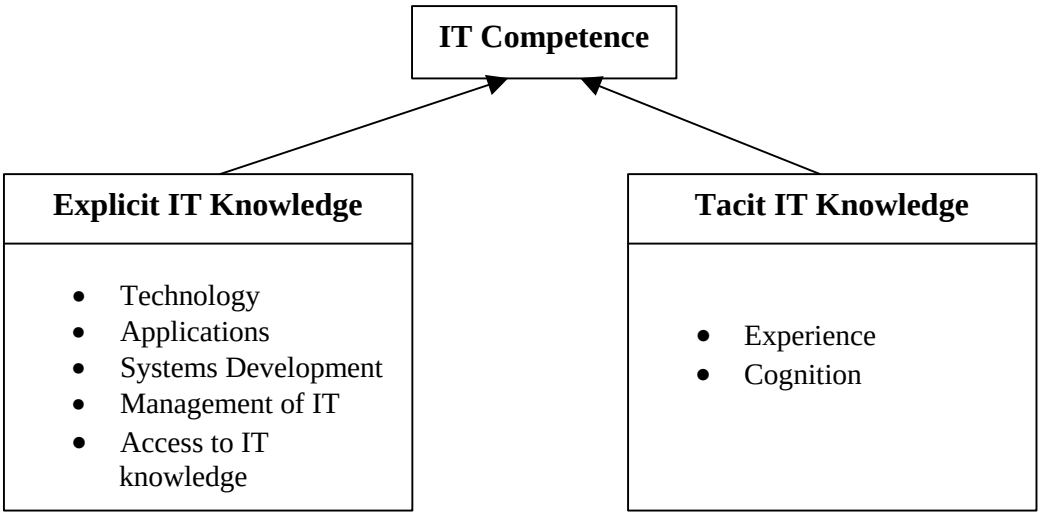

Figure 1. Model of IT Competence (Bassellier, et al., 2001)

For individuals to be IT competent they need to have skills in three major areas; technical skills, business competence, and problem-solving ability (Ross, Beath & Goodhue, 1996; Brancheau, Janz, & Wetherbe, 1996; Grover, Ryu, Kettinger & Teng, 1995; Lee, Trauth & Farwell, 1995). This can be furthered to include competence in teamwork, creativity (Gupta & Wachter, 1998) and management (Lee et al, 1995). While technical skills are important they need to be coupled with an ability to make decisions independent of technologies so that the best decision for the business environment is made. Finally, an individual needs to be information systems literate, i.e., having knowledge of how data and information is used at all levels from individual to group and organisational levels.

Importance of IT Competence

In today's environment all professionals need to be IT competent with the ability to work alone or in teams, use a wide variety of software, solve problems and communicate effectively (McKeown & Piercy, 1997). This demand for IT competencies is increasing, especially in the areas of business functional knowledge and interpersonal skills (Lee et al, 1995). Employers need their employees to have a mix of current technical skills, interpersonal skills and well-developed business skills (Rockart et al, 1991). It has long been reported that employers find it difficult to recruit sufficient IT competent staff, and recent studies confirm a continuing need for business managers who are IT competent according to Martz & Landof (2000).

IT competence is important for a number of reasons:

- IT innovation and long-term strategic advantage (Liebmann, 2000)
- Increasing the outputs of business processes (Grover et al, 1995).
- Creates several business advantages in that IT competent staff are more effective during interaction with clients and management while being more professional and thorough when meeting customers or clients expectations (Bredin, 1992).

- Allows staff to better communicate across all departments, address the current concerns of the business and be involved in business decision making (Kinnie & Arthers, 1993).
- It is one of the essential components for developing business competitiveness (Ross et al, 1996)
- Especially important for organisations operating on a global scale (Gottliebsen, 2000).
- Enables effective organisational integration and to lead organisational change (Lee et al, 1995)
- Organisations that are IT competent can cope with change better. (Brancheau et al, 1996; Hayne and Pollard, 2000)

The fast moving pace of today's society means that it is important to maintain and update information skills. It is important to develop and maintain competence in all areas of IT, including technical and business competencies, to be able to gain maximum possible benefits. Employers have a shifting awareness that it is crucial to find people with the right aptitude and then train them further to nurture competent staff (Hoffman, 1998). Despite this there is a lack of adequate IT competence within many organisations stopping them fully reaching the potential business benefits that could be gained (Kinnie & Arthers, 1993; Sambamurthy & Zmud, 1997).

In summary, assessing IT competence allows an organisation to understand the need to train and educate personnel in a way that maximises their strong points and overcomes their weaknesses. Assessments need to be continual for several reasons. New technologies are developed and released before anyone has fully implemented and learned its predecessor. These rapid rates of continued technological growth means that the required technological skills are not always entirely current (Rockart et al, 1991). Because of the revolutionary process of technology, it is important to be aware of existing competencies. This means when new types of positions emerge, there is a better understanding of what existing skill sets can be used to fill them.

Influencing Factors

The information systems literature identifies a number of factors that influence IT use and adoption, and consequently impact on IT competence. The relevant organisational and individual factors are discussed in the following sections.

Organisation Size

Previous research reports a relationship exists between business size and level of IT adoption and use (Delone, 1981; Cragg and King, 1993; Pollard and Hayne, 2000). Different sizes and types of organisations and individuals vary in the available infrastructure they have in place to support their IT skills and development. In general, the larger the size of the organisation the more technological infrastructure and resources they have in place to support IT and the more IT knowledge their personnel have (NOIE, 2000, ABS, 2000).

H1. *Extent of IT competence will vary according to organisation size*

Work Environment

The type of organisation also affects the amount of infrastructure in place to support IT with businesses in the mining, property and business service industries having considerably higher infrastructure levels than those in hospitality and other selected service industries (ABS, 2001), although hospitality has the fastest growth rate along with the communications and construction sectors (NOIE, 2001).

H2a. *Extent of IT competence will vary according to industry sector*

Foyer (1998) suggests that it is not only the initial extent of IT competence that is important, but that it is also crucial to be committed to maintaining and further developing each individuals' IT competence. This is particularly germane as the importance of all aspects of IT competence is increasing (Grover et al, 1995). However, it is necessary to consider that different individuals place differing levels of importance on varying aspects of IT competence depending on the extent to which it affects the department in which they work (Overman, 1993).

H2b. *Extent of IT competence will vary according to department within organisations*

Age

At the individual level, age is a factor that influences IT competence with older employees reporting fewer current skills and knowledge required for IT competence (Evans, 1999).

H3. *Extent of IT competence will vary according to age group*

Gender

While the gap between level of IT experience in males and females has decreased in recent years, males still have a higher level of experience than females in IT-related technologies (NOIE, 2001). It has been suggested that this lower level of technology experience is due to females not being equally represented in the field of information systems and that balancing representation of the genders would be beneficial to the industry (Fountain, 2000).

H4. *Extent of IT competence will vary by gender*

Work Experience and Job Level

Others have discussed the influences of work experience and job level on perceptions of issues associated with the use of IT in organisations (Pollard and Hayne, 1998).

H5. *Extent of IT competence will vary according to job level*

H6. *Extent of IT competence will vary according to years of work experience*

In summary, a review of previous relevant literature reveals that, to be IT competent an individual must be knowledgeable and experienced in all of these areas as well as being able to apply this knowledge and experience to a variety of new tasks in creative ways. A comprehensive model to assess the extent of competence was used as a basis for development

of a new instrument that can be used to inform organisations about employees' current level of IT skills and experiences. In addition, a number of factors that affect IT use in large and small organisations have been identified. A gap was identified in the literature in that a measure of IT competence has not been developed and measurement of the influence of these factors on IT Competence is needed to further aid organisations in targeting the up-skilling of their employees.

Research Method

A survey was developed to assess the extent of IT competence in Tasmanian firms and identify influencing factors. To establish a set of questions for each of the two main dimensions and the seven sub-dimensions of IT competence, 44 questions were developed based on Bassellier et al.'s (2001) comprehensive model of IT competence. Next, to iteratively refine the questionnaire and establish a reasonable level of face validity, the questions were informally reviewed by the researcher, two faculty members and four graduate students. Finally, the survey was pre-tested on five business managers from various business backgrounds. They were asked to comment on flow, content, understanding and appropriateness of terminology. This process led to minor refinements in wording. Table 1 lists the 44 items grouped within the seven sub-dimensions of IT competence. All items were measured using a 7-point scale (1= "Strongly Disagree" to 7="Strongly Agree).

Demographic and socio-economic data (gender, age, type of work, work experience, job level, size of firm and industry sector/type/department) were also collected for the purposes of segmenting the results and/or testing the hypotheses.

IT Competence			Items	N	Mean	S.D.
Dimension	**Sub-Dimension**	**Component**				
Tacit Knowledge	Experience	Personal Use of Computer	3	82	6.06	1.30
		IS project experience	5	82	4.78	1.58
		Management of IT	4	83	5.57	1.61
	Cognition	Process Adaptiveness	3	83	4.27	1.53
		Vision about role of IT in organisation	4	83	5.47	1.03
Explicit Knowledge	Technology	Current and Emerging Technologies	3	82	5.45	1.54
		Current Assets	2	83	4.05	1.98
		Competitors use of IS/IT	2	82	5.26	1.07
	Application	Current and Emerging Applications	2	83	5.67	1.30
		Current Assets	2	82	3.86	0.91
	Systems Development	Development Methodologies	2	83	5.07	1.12
		Project Management Practices	2	83	4.95	1.30
	Management of IS	IT Planning and Business Deployment	3	82	4.47	1.55
		Resource Allocation	2	83	5.95	1.20
	Access to IS Knowledge	Mapping of IS knowledgeable people	3	82	4.98	1.31
		Mapping of Secondary Sources of IS Knowledge	2	83	5.16	1.38

Table 1. Items to Assess each Component of IT Competence and Descriptive Analysis

In July, 2001, the survey was distributed by post to 250 Tasmanian firms randomly chosen from all firms with the postcode "7000" on "Australia Online", a CD-database of Australian firms. Of the 250 surveys mailed, twenty-two were undeliverable. Sixty-two of the 228 delivered surveys were returned with three weeks of mailing. Of these, two surveys were incomplete and could not be used, for an initial net return of 60 (26.3%) surveys. After a follow-up letter was sent, 38 additional surveys were returned. Seven of these were incomplete, resulting in 31 (13.6%) usable returns from the second mailing. Further examination revealed that eight responses were from respondents who classified themselves as "clerical" level workers. Since the purpose of the study was to report the IT competence of business managers/professionals, these eight responses were also deemed unusable. The resulting 83 usable responses represented a 36.4% adjusted return rate, which is considered acceptable by Neumann (2000) and others (Bourque, L.B. & Fielder, E.P., 1995). All returned surveys were date stamped to enable comparison between early and late responders.

Validity and Reliability

Each of the 44 items in the survey was carefully worded based on guidance provided by Bassellier, et al. (2001) in the thoughtful development of their comprehensive model of IT competence. Content and face validity were addressed through the pre-testing of the survey.

Table 2 gives the mean and standard deviation for each multiple item scale in the questionnaire at the dimension and sub-dimension levels. It is noted that all items were found to have a mean value ranging from 4.48 to 5.85 on the 7-point scale of agreement. This indicates that respondents have a moderately high extent of IT competence across all sub-dimensions. Furthermore, the standard deviations ranging from .68 to 1.35, indicate a high degree of cohesiveness among respondents on each of the scales. To assess the reliability of the questionnaire, Cronbach (1981) alpha coefficients for the seven subscales were calculated. Cronbach's alpha is the most widely used measure of internal consistency. An alpha coefficient of .60 or greater for newly developed instruments is considered an acceptable measure of reliability (Nunally, 1978). One item was eliminated from the systems development component, during the process of assessing alpha if an item were dropped, resulting in a 43-item scale. In the current study, Table 2 shows that all subscales had a Cronbach's alpha in excess of .60 with the exception of "Applications". The Cronbach's alpha for the overall construct of IT Competence was .90, which is more than acceptable for a newly developed instrument.

Dimension	**Sub-Dimension**	**Items**	**N**	**Mean**	**S.D.**	**Alpha**
Tacit Knowledge (19 items)			**76**	**5.04**	**1.00**	**.84**
	Experience	12	83	5.16	1.38	.91
	Cognition	7	83	4.92	1.24	.69
Explicit Knowledge (24 items)			**73**	**5.03**	**0.77**	**.85**
	Technology	7	83	4.98	1.13	.68
	Applications	4	83	5.48	0.98	.57
	Systems Development	3	79	4.46	0.69	.67
	Management of IT	5	83	4.72	1.28	.72
	Access to IT Knowledge	4	79	5.82	1.09	.66
Overall IT Competence (43 items)			**69**	**4.98**	**0.83**	**.90**

Table 2. Reliability and Measurement of Variables (n=83)

Response Bias

A T-Test was used to compare all demographic and socio-economic variables on responses returned before the follow-up letter with those received after. No significant differences ($p<.05$) were reported on any variable indicating there was no response bias between the two sets of responses. This allowed all responses to be grouped together for analysis purposes.

Results

Respondents comprised of 52 males, 30 females and one undeclared. Six respondents were 29 years or under, 57 fell into the 30 to 49 yr. age group and 19 respondents were aged 50 or older. Respondents have been in the workforce for an average of 24.02 years and averaged 9.08 years with their current company.

Table 3 shows the composition of industry sectors, departments, job levels and the types of work reported. The largest percentage of respondents (33.6%) worked in the service sector, including medical, legal, financial, consulting, tourism, and education/government. Overall, respondents represent a diverse range of industries and functional departments. Respondents represented 71% small firms (20 or less employees) and 29% medium firms. No large firms were represented. Over half (49.4%) of respondents were in executive positions, indicating a high level of workforce experience. Overall, the data revealed a diverse sample of experienced managers in mostly small firms in a variety of industry types across service and non-service industry sectors.

Measuring IT Competence

As shown in Table 2 above, on the whole, business managers in Tasmania have an average level of overall IT competence that falls on the positive side of the seven-point scale (Mean = 4.98, S.D. .83). In the following sections, extent of competence at the dimension, sub-dimension and component levels is reported to give a more detailed picture of the extent to which business managers in Tasmania are knowledgeable and experienced in the area of information technology.

Tacit Knowledge

Tacit knowledge consists of two sub-dimensions: experience and cognition. Tasmanian business managers reported a higher average level of experience (5.16, S.D. 1.38) than cognition (4.92, S.D. 1.24). Using a Pearson's correlation coefficient to assess the bivariate relationship between the two interval scales, they were not significantly different.

Average overall tacit knowledge was consequently relatively high (5.04, S.D. 1.00).

Explicit Knowledge

Explicit, or skills-based, knowledge was assessed through five sub-dimensions: technology, applications, systems development, management of IT and IT knowledge acquisition. Averages levels of competence in these areas ranged from 4.46 to 5.82. Interestingly, the highest sub-dimension was 'Access to IT knowledge", i.e., knowing where to get IT knowledge if they were lacking themselves. Average level of overall explicit knowledge (5.03, S.D. .77) was almost identical to that of tacit knowledge, indicating a balanced IT competence profile of the respondents as a whole.

Industry Sector	N	Percent	Department	N	Percent
Consultancy services	8	9.6	I.S./Dept. Processing	4	4.8
Financial services	8	9.6	Administrative	23	27.7
Medical and Legal services	8	9.6	Finance/Accounting	7	8.4
Tourism and Hospitality	4	4.8	Mktg./Sales	20	24.1
Education/Government services	10	12.0	Manufacturing	7	8.4
Manufacturing	6	7.2	Service	3	3.6
Construction/Mining/ Agriculture	4	4.8	Unclassified	11	13.3
Computing	3	3.6			
Transportation/Petroleum	2	2.4	**Job Level**	**N**	**Percent**
Wholesale/Retail Trade	18	21.7	Senior Executives	41	49.4
Unclassified	12	14.5	Middle Managers	37	44.6
			Professionals	3	3.6
Organisation Size			Unclassified	2	2.4
1-5	34	41.0			
6-20	25	30.1			
21-200	24	28.9			

Table 3. Profile of Respondents (N=83)

Hypothesis Testing

To answer the second research question, a one-way ANOVA was calculated to test each of the research hypotheses. Bonferroni's Multiple Comparison post hoc test was used to identify which pairs of groups were significantly different. In those cases where the assumption of homogeneity of variance was not met, the Kruskal-Wallis non-parametric test was used, as noted. All tests are reported at the 95% confidence level ($p<.05$). For completeness, each hypothesis was tested at all levels of IT competence: overall, dimension, sub-dimension and component.

Organisational Characteristics

Size

H1. Extent of IT competence will vary according to organisation size

H1 is partially supported. The Kruskal-Wallis non-parametric independent group comparison was used to test H1 inasmuch as the Levene's Test of Homogeneity of Variance was significant ($p<.05$) on a number of the variables tested. Although organisation size does

not relate to overall IT competence, an analysis of the other levels of IT competence revealed that all groups differed significantly on the 'systems development' sub-dimension of IT competence. A direct relationship between organisation size and systems development was evident in that organisation size increased significantly from micro (mean 4.24, SD .65), to small (mean 4.35, SD .65), to medium (mean 4.87, SD .63). At the component level, similar significant differences emerged in 'personal use of computers' between respondents in micro (mean 5.64, SD1.49) and medium-sized (mean 6.64, SD .62) organisations.

Environment

H2a. Extent of IT competence will vary according to industry sector

H2a is rejected. Respondents in industry sectors were not significantly different from each other in their extent of IT competence in any dimension, sub-dimension or component.

H2b. Extent of IT competence will vary according to departments within organisations

H2b is rejected. No significant differences were reported between levels of IT competence of respondents in different departments within their organisations.

Individual Characteristics

Age

H3. Extent of IT competence will vary according to age group

H3 is partially supported. Although no significant differences were reported at the dimension or sub-dimension levels, differences exist at the component level in 'development methodologies' (F 6.714, sig. .005) and 'IT planning and business deployment' (F 4.085, sig..02). The respondents in the 'under 29' group (mean 5.25, SD 1.06) were significantly more competent in systems development methodologies than those in the 'over 50' group (mean 3.43, SD .89). On the other hand, the 'over 50' group (mean 5.17, SD 1.48) was significantly more knowledgeable about their organisation's IS strategies, vision and policies than those in the 'under 29' (mean 2.50, SD 1.18) and those between 30 and 49 yrs. (4.94, SD1.19).

Gender

H4. Extent of IT competence will vary by gender.

H4 is rejected. Males and females were not significantly different on any dimension, sub-dimension or component of IT competence.

Job Level

H5. Extent of IT competence will vary according to job level.

H5 is partially supported. Senior managers differed significantly (F 3.302, sig. .042) at the sub-dimension level of 'cognition'. They had a better grasp (mean 5.26, SD 1.17) of interactions with their organisations, the extent to which information was exchanged, and the role of technology within the organisation than those reported by those in less senior

positions (mean 4.46, SD 1.13). Significant differences (F 4.742, sig. .011) were also reported in the 'secondary sources' component of IT competence. Senior managers (mean 5.26, SD 1.17) were also significantly more tuned in to where to find sources of IT knowledge when they were lacking than middle managers and professionals(mean 4.10, SD 1.15).

Work Experience

H6. Extent of IT competence will vary according to years of work experience.

H6 is partially supported. Respondent with differing periods of work experience differed significantly on the sub-dimension of 'access to IT knowledge' (F 3.56, sig. .033) and the component 'management of IT' (F 4.378, sig. .016). While respondent in the '11-20 year' group (mean 5.49, SD 1.35) would be expected to have significantly more IT management experience than those who had work experience of ten years or less (mean 4.17, SD 1.25), it is interesting that those with 21 years or more (mean 4.49, SD 1.63) had significantly less. However, the data also revealed that those with 11-20 years work experience are less likely to use the internet or know where to find secondary sources of IT knowledge when they needed it (mean 5.65, SD 1.07) than those with more than 20 years experience.

Table 4 summarises the significant findings. Cells marked with a "D" indicate a direct relationship between dependent and independent variables. Cells marked with an "I" indicate an indirect relationship. Empty cells indicate a lack of significance between groups. Components, dimensions and sub-dimensions that revealed no significant differences between groups are not included for the sake of clarity.

Measure of IT Competence			Influencing Factors			
Dimension	**Sub-Dimension**	**Component**	**H1 Size**	**H3 Age**	**H5 Job Level**	**H6 Work Exp.**
Tacit Knowledge	Experience	Personal Use of Computer	**D**			
	Cognition	Process Adaptiveness			**D**	
		Vision about role of IT in organisation			**D**	
Explicit Knowledge	Systems Development	Development Methodologies	**D**	**I**		
		Project Management Practices	**D**			
	Management of IT	IT Planning and Business Deployment		**D**		**I**
		Resource Allocation				**I**
	Access to IS Knowledge	Mapping of IS knowledgeable people				**D**
		Mapping of Secondary Sources of IS Knowledge			**D**	**D**

Table 4 – Summary of Hypothesis Testing

Discussion

In answer to the first research question, "To what extent are Tasmanian business managers IT competent? relatively high levels of IT competence within Tasmanian business managers were found. This is encouraging in that Sambamurthy and Zmud (1997, in reporting the results of their study of the development and deployment of IT competency in 230 U.S. organisations, described how those firms that were characterised by high levels of IT management competency outperformed those organisations that reported lower levels of IT competency.

In addition, the usefulness of Bassellier, et al.'s (2001) multi-level IT competence model was demonstrated by the differing levels of IT competence reported at the various dimension, sub-dimension and component levels. For example, levels of competence in the dimensions of tacit and explicit knowledge were relatively evenly balanced. However, within each of these dimensions, respondents reported strongest competence levels in the business-related components, i.e., personal use of computers, management of IT, vision about role of IT in the organisation, competitors' use of IT, resource allocation and mapping of secondary sources of IS knowledge. Weaker competence levels were evident in some of the more technical components, i.e., current IT application assets, current technology assets and process adaptiveness.

In answering the second research question, "What factors influence their extent of IT competence?" organisational factors, such as systems development and personal use of computers appeared to increase along with organisation size, while no support was found for differences in IT competence and environmental variables. In contrast, analysis of individual variables showed that while younger respondents reported greater technical skills, older respondents were stronger in their knowledge of how to plan and deploy IT. Surprisingly, no support was found for the effect of gender. At the job level, those in more senior positions were more adaptive and visionary and their mapping of secondary sources of IT knowledge was superior. On the other hand, those in the mid-range for years of work experience were less proficient at acquiring IT knowledge but had more IT management experience.

Limitations

The sample was limited to a regional area of Australia, where the majority of organisations are small, as a consequence, the generalisability of the results should be considered with caution since previous IS research has reported distinctly different skills sets and IT use in small firms.

In addition, in assessing these findings it should be remembered that results reported here report on a preliminary test of a new measurement instrument with a relatively small sample.

Implications for Practice

The findings highlight a number of issues related to organisation size, employee age, job level and work experience that influence IT competence. Based on these results and previous links between IT competence and performance, it is suggested organisations need to integrate business managers and IT managers more fully in discussions of IT initiatives and encourage the development of fundamental IT competencies necessary to move forward such initiatives. The findings also suggest that small firms need to further integrate personal computer use into all levels of their business and provide appropriate training to encourage such use. Similarly, with the apparent deficiency in systems development knowledge, a better integration between business and IT staff and/or outside consultants in small firms need to be fostered. A mentoring programme between senior managers and lower level managers might also be advantageous to promote disseminate tacit knowledge and the more esoteric facets of explicit knowledge (mapping secondary sources of IT knowledge). Ultimately, it might be useful for organisations to use this IT competence instrument as a basis for a structured competency-enhancement programme involving business managers and IT managers to conduct an assessment to highlight areas of IT competence that require attention.

Suggestions for Future Research

These results are only a first step in measuring the different components of IT competence as suggested by Bassellier, et al. (2001). Further testing of the instrument developed here, using larger sample sizes and the resulting ability to apply more rigorous assessment through factor analysis or multidimensional scaling, need to be undertaken to increase confidence in its reliability and validity. In addition, future research of a wider variety of organisational size needs to be conducted taking the influencing factors reported here into account. It is hoped that these preliminary findings will prompt other researchers to take up the challenge and further investigate this interesting, important and emerging area of research.

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