A CEO VIEW OF THE KEY ISSUES IN AUSTRALIAN INFORMATION SYSTEMS MANAGEMENT - 1997

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ABSTRACT

As part of a research programme on key information systems management issues, a survey of Australasia's largest 500 organisations was conducted to identify which issues were perceived by their chief executive officers (CEOs) as being important, problematic and critical over the next three to five years. The results reported are based on a relatively low response rate (though perhaps reasonable for the target group) so should be regarded as only exploratory. The most critical issues were revealed to be a mix of technology management issues (IT infrastructure, disaster recovery), strategic management issues (BPR, competitive advantage, information architecture), people management issues (organisational learning), systems development and data management issues (effective use of the data resource, effectiveness/productivity of IS, effectiveness of software development), and their own support systems (EIS/DSS). This reflects their interest in a wide range of issues, but all with an organisation-wide focus. Non-critical issues were mostly related to the individual technologies and the place and role of IS in the organisation. While the CEOs showed some agreement with their chief information officers (CIOs) on issues such as the IT infrastructure, competitive advantage, and organisational learning some distinct differences exist, particularly in relation to the quality and effectiveness of systems and processes and also how CEOs and CIOs perceive each other.

Keywords

IS Management Issues; Data Resource Management; Organising IS; IS Research Issues.

INTRODUCTION

In recent years, and for the foreseeable future, organisations are facing rapidly changing business environments which challenge their executives (both IS and non-IS) to handle issues such as downsizing, outsourcing, leveraged buyouts, strategic alliances, flexible manufacturing, just-in-time scheduling, globalisation, business process reengineering and total quality management. These environmental changes place demands on their IS departments to support product innovation, new production techniques, and changing organisational designs, and provide timely, high-quality information.

Identifying and handling key issues in the management of information systems is essential for IS executives to support their organisations efficiently and effectively. The investigation of these key issues by researchers serves to enhance understanding of the concerns of IS executives and suggest relevant areas of investigation by IS management researchers. This particular study, which focuses on the views of CEOs on the key IS management issues, is part of a research program which aims to:

- determine the IS management issues most important, problematic and critical to Australasian executives (CIOs and CEOs) over the next 3-5 years;
- examine differences between the views of CIOs and CEOs to better understand their problems in relation to IS/IT;
- examine trends in the status of different issues over time;
- inform industry (IS and non-IS) of current and future issues;
- inform IS researchers of relevant issues to investigate.

OTHER KEY IS MANAGEMENT ISSUES STUDIES

Many key issues studies have now been carried out, but most (for example, Pervan 1996, Brancheau et al. 1996) have been concerned with the views of IS executives only. An historical summary of the few major studies which have included (and specifically presented) non-IS executive views is been provided in Table 1 below:

The most common research approach used has been the postal survey, either single-round or in three-round Delphi studies. All of the above studies have obtained opinions from IS managers and other non-IS managers. In most cases the organisations sampled have been quite varied in size and industry, and the sample sizes, number and type of issues have varied significantly. The studies have generally sought opinions of the major 'key' or 'critical' information systems management issues facing these organisations. This particular study has followed the methodology of the recent Australian CIO study (Pervan 1996) in considering issues as *important* (they have a significant impact within the organisation), *problematic* (they are difficult to manage), and *critical* (they are both important and problematic).

Authors	Year of Study	Country	Sample (Response rate)	Total No. of Issues	Research Method
Brancheau & Wetherbe	1987	U.S.A	IS & Gen. Mgrs. (68/180)	26	Three round Delphi Survey
Moynihan	1990	Ireland	CEOs/IT Mgrs. (49/??)	??	Structured Interviews
Caudle, Gorr & Newcomer	1991	U.S.A	PS Mgrs. (354 / 1054)	37	Survey
Galliers, Merali & Spearing	1992	United Kingdom	Managers (incl. IS) (98/??)	26	Survey
Wang & Turban	1994	Taiwan	IS & Gen. Mgrs. (297 / 928)	30	Survey
Davis, Menon, Munday, Thomson & Young	1995	New Zealand	Various (118/392)	23	Three round Delphi Survey

Table 1: A History of Key Issues Studies involving Non-IS Executives

THE KEY ISSUES

As indicated in Table 1 (column 5), there are many different IS management issues. While most researchers accept that IS executives must handle many *technology management (TM)* issues, there is a growing acceptance that there are many *strategic management (SM)* issues which are equally, if not more, important. Other categories of issues include *systems development and data management (SDDM)*, *people management (PM)*, and *end-user computing (EUC)*. The issues in each category are listed in Table 2 below. (For a thorough description and explanation of each issue, see Pervan (1997).) These issues have changed over time, but those included below are identical to the most recent Australian study of CIOs (Pervan 1996, 1997).

RESEARCH DESIGN

In order to provide information concerning the key IS management issues, a postal survey of the CEOs of the top 500 Australasian organisations was conducted in February/March, 1997. The mailing list used was identical to that used for the CIO study in 1996. In the course of the development of this mailing list, some organisations were removed because they were either subsidiary to other (larger) organisations on the list or because we were aware they had a company policy against participation in any surveys. A final list of 452 CEOs was produced. Each questionnaire was identified by printing the organisation's rank on each page so that the responses were not anonymous (but confidential of course). This enabled key financial indicators for each responding organisation to be extracted from the original source of the Top 500 list (Jaques 1995).

The aim of this study was to identify the key IS management issues for these organisations over the next 3-5 years. The approach taken was similar to the most recent Australian CIO study (Pervan 1996) where the respondents were asked to rate both how *important* and how *problematic* each issue was for their organisation. A list of 31 issues with an associated paragraph of explanation for each issue was produced (the same list as for the CIO study). In addition to the brief title for each issue, a paragraph explaining the issue (its 'rationale') was included to ensure that the meaning of each issue was interpreted consistently across all respondents. These 31 issues have been discussed previously (see Pervan 1996, 1997). The questionnaire also contained a brief set of questions seeking information on current characteristics of the organisation (ownership, business activity, structure, management style) and of future plans (in market share, staffing, acquisitions, diversification, and IT outsourcing).

THE RESULTS OF THE STUDY

Valid questionnaires were received from 33 of the 452 organisations. While the response rate of 7.3% is low, it may be considered reasonable for the group targeted (namely the CEOs of Australia's largest organisations, and hence very busy people). Table 3 below shows that these are indeed large organisations with revenue, assets and profits measured in the billions of dollars. Table 4 shows the location of company headquarters and the sector to which that organisation's primary activity belongs. These tables show that, though the sample is relatively small, a wide range of the organisations targeted (from the 13th and 486th ranked organisations) did respond and the results may be moderately generalisable for large Australian organisations. Nevertheless, the discussion which follows should be read as only 'indicative' because of the response rate.

Technology Management Issues
Building a responsive IT infrastructure
Measuring IS effectiveness and productivity
Improving data integrity and quality assurance
Developing and managing electronic data interchange
Planning and integrating multi-vendor open systems technologies
Integrating data processing, office automation, and telecommunications;
Managing data and document storage
Planning and managing communications networks
Implementing and managing collaborative support systems
Establishing effective disaster recovery capabilities
Strategic Management Issues
Improving is strategic planning
Developing and implementing an information architecture
Aligning the is organisation within the enterprise
Outsourcing selected information services
Determining appropriate is funding levels;
Facilitating and managing business process redesign
Using information systems for competitive advantage
People Management Issues
Recruiting and developing IS human resources
Facilitating organisational learning
Educating senior management in relation to IT
Increasing understanding of IS role and contribution
Systems development and data management issues
Improving the effectiveness of software development
Selecting and integrating packaged applications software
Making effective use of the data resource
Managing the existing portfolio of legacy applications
Developing and managing distributed systems
Improving information security and control
Planning and managing the applications portfolio
Planning and using case technology
End-user Computing Issues
Facilitating and managing end-user computing
Facilitating/managing executive and decision support systems

Table 2: List of Key Issues and Categories

Variable	Mean ($b)	St. Dev. ($b)	Min. ($b)	Max. ($b)
Revenue	0.722	1.222	0.172	6.536
Assets	0.905	1.800	0.054	9.218
Profit	0.048	0.127	-0.092	0.579

Table 3: Respondent Organisations - Financial Data

HQ / Sector	Vic	NSW	SA	Qld	WA	Tas	ACT	NT	Total
Resources/Mining	1	1	1	1					**4**
Retail/Trading	1	1							**2**
Services		1	1	2	1	1			**6**
Manufacturing	9	2	2		4				**17**
Government	1						2	1	**4**
Total	**12**	**5**	**4**	**3**	**5**	**1**	**2**	**1**	**33**

Table 4: Respondent Organisations - HQ and Industry Sector

As Table 4 above indicates, responses were received from all states and territories. The largest sector represented in the sample (and in the target Top 500 population) was manufacturing (51%), while major government instrumentalities for energy, water, and transport made up the 12% from the government sector. The two most populous states, New South Wales and Victoria, made up 51% of the sample, confirming that the majority of company headquarters of large Australian organisations are in Sydney and Melbourne. The representation of industry sectors, states, and company finances (assets, profit, revenue) was similar to the corresponding groups in the CIO study.

Ownership of most of these organisations is Australian (64%), as is the focus of their business activity (only 18% international). Organisational structure was mostly flat (63% vs 37% hierarchical), mostly along divisional/functional lines (82% vs 18% cross-functional), centralisation was evenly split between centralised and decentralised, and management style varied between 'formal procedures and rules' (19%), 'few rules, greater autonomy' (37%), and 'co-operative and group-oriented' (44%). Most were planning expansion of sales/market share (90%), more acquisitions (80%), greater diversification of products and services (61%) and greater IT outsourcing (67%), while reducing staff numbers in the organisation (59%).

Critical Issues

As indicated earlier, respondents were asked to rate both how *important* an issue will be for their organisation over the next 3-5 years, and how *problematic* the issue might be. These were both rated on a 1 to 10 scale where 1 represented a lowest priority issue and 10 represented a highest priority issue. All respondents provided a score for both on all issues. As in the CIO study, how *critical* an issue was to the organisation's CEO was calculated as the arithmetic mean of the ratings for important and problematic. The ten most critical issues, with their ranking, mean and standard deviation of critical rating, are shown in Table 4 below. A full list showing mean and standard deviation for all 31 issues is provided as Appendix A.

Rank	ISSUE	Issue Category	Mean Rating	Std. Dev.
1	Making effective use of the data resource	SDDM	7.16	1.78
2	Building a responsive IT infrastructure	TM	6.97	1.34
3	Facilitating organisational learning	PM	6.84	1.64
4	Facilitating and managing business process redesign	SM	6.83	1.70
5	Using information systems for competitive advantage	SM	6.80	1.85
6	Measuring IS effectiveness and productivity	TM	6.77	1.65
7	Developing and implementing an information architecture	SM	6.75	1.40
8	Establishing effective disaster recovery capabilities	TM	6.73	1.78
9	Improving the effectiveness of software development	SDDM	6.64	1.94
10	Facilitating/managing executive and decision support systems	EUC	6.58	1.91

Table 5: The Ten Most Critical Issues

The relative ranking of issues within the top 10 should not be overly highlighted because their mean ratings range only by 0.58 on a 10-point scale and the average standard deviation is 1.70. However, it is interesting to note that each of the five issue categories have one or more issues in this top group. While it might be supposed that CEOs would not be overly concerned with technology management, this is contradicted by the appearance of *IT infrastructure, disaster recovery*, and *IS effectiveness measurement* (all technology management issues). However, this should come as no surprise in such a rapidly changing technological environment. It is clear that the provision of a responsive IT infrastructure (ranked #2) is a fundamental concern for the organisation and that the ability of that infrastructure to respond to disaster situations is an organisation-wide problem in the 1990s. A closer examination of the data revealed that a responsive IT infrastructure was rated significantly higher (in a one-way ANOVA at the 1% level) by CEOs planning expansion in staffing and greater diversification of products and services in the next 3-5 years. In these organisations the IT infrastructure would depended on to support this increased organisational size and complexity.

Many organisations would not be able to survive more than a few days without their IT facilities (O'Brien 1993) so disaster recovery (ranked #8) might be expected to be a major issue. Measuring the effectiveness and productivity of the organisation's information systems and technology (ranked #6) is clearly of major concern to the CEOs given the scale of investment in this infrastructure. Clearly, the CEOs are expecting 'value for money',

and rightly so. Sensibly, the CEOs recognised that this issue was particularly critical if they were planning increased IT outsourcing (as indicated by a significantly higher critical rating for measuring IS effectiveness among organisations planning more IT outsourcing).

Educational issues also rank highly, with *organisational learning* ranked 3rd and *EIS/DSS* (which involves similar motivations and contains a significant user training/education component)) ranked 10th. Organisations (and the people in them) require continuous learning about ways to better utilise the information resource and integrate new technologies into the organisation (Niederman et al. 1991). IT education is therefore critical and can lead to increased productivity and reduced applications backlogs (Brancheau and Brown 1993). Significant increases in innovation and productivity from an organisation's IT investment can be derived from an emphasis on supporting and managing organisational learning in the organisation (Henderson and Lentz 1996). The high ranking of EIS/DSS may be interpreted as a concern by CEOs for their own personal support, but these systems are aimed at supporting managers and decision makers in organisations (Laudon and Laudon 1991) and CEOs would see this as key to the effective operation of the organisation.

Strategic management issues which ranked highly were *business process redesign, IS for competitive advantage,* and *information architecture.* Business process redesign (ranked #4) has been a top issue among CEOs and CIOs for several years (Watson et al. 1997). Many organisations are focusing on a radical redesign of their business processes in order to achieve dramatic improvements in performance and innovative and effective applications of information technology are seen by many as a vehicle for achieving this (Hammer and Champy 1993). Further analysis revealed that BPR was seen to be significantly more critical for organisations planning to concentrate their activities more, perhaps reflecting that some radical redesign of existing processes may be necessary to achieve this concentration effectively. Further, through the innovative use of IT, organisations may find new ways to realise competitive advantage.

A corporate information architecture (ranked #7) is a high-level map of the information requirements of an organisation (Brancheau and Wetherbe 1987) which is used to identify key information needs and how this information relates to key business processes. Its development is necessary in order to guide the development of these innovative applications and facilitate the integration and sharing of data (Niederman et al. 1991). Further analysis revealed that this issue was significantly more critical for more decentralised organisations, an indicator that this high level information map may be more difficult to develop in more decentralised organisations.

The CEOs also perceive *the effective use of the data resource* and *the effectiveness of software development* as critical issues. The data resource in most organisations is becoming larger, more complex, and greater in cost and value. Matheus et al. (1993) claim that the data resource is often poorly recognised, difficult to access, and poorly utilised. Effective information systems can provide users with timely, accurate, and relevant information, but the backlog in the development of these systems remains at unacceptably high levels in many organisations (Laudon and Laudon 1994). This is exacerbated by changing hardware platforms and new software development tools arriving on the market, which the developers have to learn and utilise. The CEOs, understandably, are particularly concerned with maximising the return from their substantial investment in IT and having it available on time, in budget, and with the right form and content.

In summary, the most critical issues were revealed to be a mix of technology management issues, strategic management issues, people management issues, systems development and data management issues, and end-user computing. This reflects a broad range of concerns for the CEO in relation to IT. However, a closer examination of the issues reveals a major concern for organisation-wide issues and optimising the return from their IT investment.

Non-Critical Issues

Rank	ISSUE	Issue Category	Mean Rating	Std. Dev.
22	Managing existing portfolio of legacy applications	SDDM	6.05	2.19
23	Developing and managing distributed systems	SDDM	6.02	1.97
24	Outsourcing selected information services	SM	5.92	2.02
25	Increasing understanding of IS role and contribution	PM	5.91	1.88
26	Managing data and document storage	TM	5.83	1.85
27	Determining appropriate IS funding levels	SM	5.75	1.87
28	Recruiting and developing IS human resources	PM	5.63	1.97
29	Multi-vendor open systems technologies	TM	5.48	2.34
30	Planning and managing the applications portfolio	SDDM	5.31	1.97
31	Planning and using CASE technology	TM	4.58	2.32

Table 6: The Ten Least Critical Issues

The issues which were rated the ten least critical are shown in Table 6 above. Overall, it may be observed that individual technology management and systems development and data management issues are of little concern to the CEO. Six of the ten least critical issues relate to individual information technologies (#26 *data/document storage*, *#29 multi-vendor integration*, and #31 *CASE technology*) and three relate to specific systems management issues (#22 *legacy applications*, *#23 distributed systems*, and #30 *applications portfolio*). While these individual systems and technologies are part of the overall infrastructure, they may be seen to be the province of the CIO (as is the *recruitment/development of their IS human resources, #28*), while it is their overall responsiveness, usefulness and stability which is of greater concern to organisation as a whole. The same argument may hold true for *IT outsourcing* (#24) as it may be seen as the CIOs job to determine what is actually provided in-house or outsourced and the CEO is interested only in results. (Not surprisingly, the further analysis revealed that IT outsourcing was seen to be a significantly more critical issue for those organisations planning more IT outsourcing in the next 3-5 years.)
The results in Table 6 also reveal that the CEOs show little concern for *understanding IS role and contribution* (#25) and *determining appropriate IS funding levels (#27)*. These issues may also be seen by the CEO as a job for the CIOs and their area.

Comparison of Australian CEOs and CIOs

The ranking of the critical issues as perceived by the Australian CIOs in the final round of the 1996/97 study have been added in the final column of Appendix A. The Spearman's rank correlation calculated on the paired (CEO and CIO) rankings was 0.6956 which is significant at the 0.1% level. This confirms that there is substantial agreement between the views of the CIOs and CEOs on the key IS issues in these large organisations. That there is fairly strong consensus on the key issues is a positive sign and may indicate the fairly advanced stage of IT growth in these large organisations and sound lines of communication between CIOs and CEOs in these organisations. However, there are some distinct differences in CEO and CIO rankings on a few issues and these are summarised in Table 7 below.

CEO Rank	ISSUE	CIO Rank
	Issues more critical to the CEO than to the CIO	
4	Facilitating and managing business process redesign	18
6	Measuring IS effectiveness and productivity	12
7	Developing and implementing an information architecture	15
9	Improving the effectiveness of software development	22
12	Improving data integrity and quality assurance	19
	Issues more critical to the CIO than to the CEO	
13	Educating senior management in relation to IT	3
15	Planning and managing communications networks	5
16	Improving IS strategic planning	6
19	Aligning the IS organisation within the enterprise	10
25	Increasing understanding of IS role and contribution	13

Table 7: Issues Seen Differently by CEOs and CIOs

The first five issues above are those much more critical to CEOs than to CIOs. All of these issues can be interpreted to have a focus on ensuring that the organisation's IS and IT delivers on its promises. Quality and effectiveness of data and systems are the common themes in these issues. While it is clearly appropriate for the CEOs to be concerned with these issues it is perhaps a little alarming that the CIOs do not show quite the same concern for providing the services whose delivery is their responsibility. IS departments and their managers in these large Australian organisations may need to be more focused on service and on perceiving the non-IS people in the organisation as 'customers' rather than 'users' (Pitt et al. 1995).
The last five issues above are those more critical to the CIOs than to CEOs. It is quite reasonable that communications networks, the key technology underpinning the IT infrastructure now and in the future, should be ranked higher by CIOs as it is their specific function to ensure that this technology works effectively. It is also reasonable that issues such as IS planning, IS organisational alignment, and increasing understanding of the IS role and contribution should all be ranked higher by the CIOs as they are essentially their responsibility. However, it is interesting (perhaps even amusing) to observe that CIOs see a greater need for the IT education of senior management than do the senior managers themselves! This difference of view about the senior

management's IT knowledge may reflect the long-held perception by IS professionals that a poorly educated (in relation to IT) senior management is a continuing obstacle to IT growth. Interestingly, the same difference of opinion on senior management IT education occurred in the most recent UK study (Galliers et al. 1994). However, their is inherent danger in this apparent conflict of views on the senior management's need for greater IT education which may need to be addressed with better communication.

In summary, there is a good degree of consensus between Australian CEOs and CIOs on the key IS management issues and, except for the IT education of senior management, any differences are explainable by their roles and so could be considered reasonable.

CONCLUSIONS, LIMITATIONS AND FURTHER RESEARCH

This paper has presented some results from a study of the key issues facing chief executives in Australia's largest organisations. The most critical issues were a mix of technology management issues (IT infrastructure, measuring IS effectiveness, disaster recovery), strategic management issues (business process redesign, competitive advantage, responsive information architecture), people management issues (organisational learning), systems development and data management issues (effective use of the data resource, effectiveness of software development), and end-user computing (executive and decision support systems). This range of IS management issues are of major concern to CEOs. However, it is quite clear that CEOs are greatly concerned with 'the bottom line' in relation to their IT infrastructure with effectiveness in relation to the data resource, software development, and the measurement of the IS function generally. CEOs want a sound return on their IT investment and it is the role of the IT professionals to ensure that they are effective and can be shown to be so (with appropriate measurement).

Issues perceived by the CEOs as non-critical were mostly related to the management of specific systems and several individual technologies which must be integrated and managed to ensure a responsive IT infrastructure, as well as a number of clearly CIO roles. IT outsourcing was ranked surprisingly low (considering its apparent popularity), but it did rate as a more critical issue for those organisations actually planning to implement IT outsourcing in the next few years. These same organisations considered the measurement of effectiveness of their IS as more critical as this would be a key factor in what functions to outsource and to what extent.

On a positive note, CIOs and CEOs were in broad agreement on the majority of the issues though the CEOs had, as would be expected, a more organisation-wide focus and were clearly more concerned about receiving a good return from their substantial IT investment. On the other hand, for CIOs some of the more critical issues were directly concerned with their specific role in managing the organisation's IS/IT. These differences are as would be expected according to the roles filled by CEOs and CIOs. However, CIOs perceived the senior management's IT education as a more critical issue than the CEOs themselves and this may imply a lack of communication or at least of understanding of each other.

This survey has some limitations associated with the response rate, but the results were interesting and the comparisons between CEOs and CIOs of some value. It is hoped that by providing both target groups with the results of both surveys, they will see where their differences of opinion are, and this may lead to better communication between them so that these differences might diminish over time. Further analysis of both surveys is being undertaken and comparisons are being followed up with recent similar studies in other countries. It is hoped that this and other follow-up studies will serve to assist CEOs, CIOs, and IS researchers identify areas of interest in the management of information systems and information technology. Further, to assess the limitation imposed by the low response rate, a follow-up mailout to non-respondents is planned and non-response bias will be measured.

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Appendix A: CEO's Critical Scores for all Key Issues

Rank	ISSUE	Issue Category	Mean Rating	Std. Dev.	CIO Rank[1]
1	Making effective use of the data resource	SDDM	7.16	1.78	2
2	Building a responsive IT infrastructure	TM	6.97	1.34	1
3	Facilitating organisational learning	PM	6.84	1.64	7
4	Facilitating and managing business process redesign	SM	6.83	1.70	18
5	Using information systems for competitive advantage	SM	6.80	1.85	4
6	Measuring IS effectiveness and productivity	TM	6.77	1.65	12
7	Developing and implementing an information architecture	SM	6.75	1.40	15
8	Establishing effective disaster recovery capabilities	TM	6.73	1.78	8
9	Improving the effectiveness of software development	SDDM	6.64	1.94	22
10	Facilitating/managing executive and decision support systems	EUC	6.58	1.91	14
11	Improving information security and control	SDDM	6.53	1.75	11
12	Improving data integrity and quality assurance	TM	6.50	1.63	19
13	Educating senior management in relation to IT	PM	6.48	1.91	3
14	Facilitating and managing end user computing	EUC	6.47	1.94	9
15	Planning and managing communications networks	TM	6.33	1.72	5
16	Improving IS strategic planning	SM	6.22	1.71	6
17	Selecting and integrating packaged applications software	SDDM	6.19	1.98	16
18	Developing and managing electronic data interchange	TM	6.19	1.90	28
19	Aligning the IS organisation within the enterprise	SM	6.19	1.92	10
20	Integrating data processing, office automation, telecommunications	TM	6.17	1.54	20
21	Implementing and managing collaborative systems	TM	6.05	2.10	30
22	Managing existing portfolio of legacy applications	SDDM	6.05	2.19	27
23	Developing and managing distributed systems	SDDM	6.02	1.97	21
24	Outsourcing selected information services	SM	5.92	2.02	29
25	Increasing understanding of IS role and contribution	PM	5.91	1.88	13
26	Managing data and document storage	TM	5.83	1.85	24
27	Determining appropriate IS funding levels	SM	5.75	1.87	23
28	Recruiting and developing IS human resources	PM	5.63	1.97	17
29	Multi-vendor open systems technologies	TM	5.48	2.34	26
30	Planning and managing the applications portfolio	SDDM	5.31	1.97	25
31	Planning and using CASE technology	TM	4.58	2.32	31

[1] **Source: Pervan (1997)**