The impact of emerging practices on IS specialists: perceptions, attitudes and role changes in Hong Kong

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Abstract

The recent literature has addressed many financial and managerial aspects of downsizing, end-user computing, outsourcing, re-engineering, and CASE-based applications development. In contrast, little is known about how the IS community perceives and is affected by these emerging practices. A recent study examined the perceptions and attitudes of IS specialists in Hong Kong, London and New York City. This article reports on the survey results from Hong Kong, where staff members of IS departments expressed serious concerns about emerging IT management practices as well as their changing roles and responsibilities. Few IS specialists foresaw the rise of systems integrators/coordinators or favoured changes away from the traditional IS career path. These attitudes were related to perceptions of skill set inadequacy, limited training and self-development opportunities, and reluctance to serve as change agents. Both gender and work experience significantly affected perceptions as well as attitudes. The implications for both IS and human resource management are considered while specific areas for further research are identified. © 2001 Elsevier Science B.V. All rights reserved.

Keywords: Impact of technological change; IS management; Employee attitudes; Gender differences; Downsizing; End-user computing; Outsourcing; Business process re-engineering; CASE tools; Systems development; Human resource management

1. Introduction

Information systems (IS) specialists traditionally worked in centralized organizational units and were responsible for planning, developing, implementing, operating and maintaining information technology applications. These specialists tended to use mainframe computer platforms and the Systems Development Life Cycle methodology to automate existing work processes and/or meet needs articulated by users. In order to promote business efficiency and database integrity, end-user access to computer-based IS was severely restricted. Even as users became more active in applications development and IS operations, the computing hardware, software, and databases typically remained under the tight control of IS specialists.

This situation has changed radically. For example, Earl [14] identified a period of technological discontinuity as part of the transition from a traditional Data Processing (DP) era to a new Information Technology (IT) era. Increasingly powerful and flexible hardware and software are now distributed across organizations while end-users have improved their IT literacy and become more self-confident with IS. As their requests for systems development or enhancement work were ignored or backlogged, both line managers and end-users sought to reduce their dependence on IS specialists. Many have now achieved their aims, and
thereby reduced the agency costs associated with IS management and operations [21,31]. This transformation in IS management has included the emergence of at least five new practices. First, advances in computing hardware have prompted the downsizing of IT applications, whereby they are migrated from mainframe computers to client–server configurations or PC-based local area networks [13]. Second, a combination of technological progress and new business management philosophies has encouraged end-users to create and operate their own IS, giving rise to end-user computing (EUC). Third, even when end-users do not assume more IS responsibilities, they may be transferred from internal IS specialists to external parties, and thus give rise to outsourcing [26]. Fourth, computer-aided software engineering (CASE) tools are being used to both simplify and standardize applications development [22]. Fifth, a desire to realize greater IT benefits has redirected efforts away from the mere automation of existing work processes towards IT-enabled (radical) process innovation or business process re-engineering [19,29].

The emergence and growth of these five practices is well-documented in the IS literature. Terms such as downsizing, end-user computing, outsourcing, CASE tools and business process re-engineering (BPR) are now part of the business vernacular. Each practice significantly alters IT management, and hence can be expected to affect IS specialists. For example, genuine BPR requires changes in mind sets as well as skill sets, end-user computing and outsourcing involve significant job reassignments, and downsizing is accompanied by redistributed (and perhaps even new) responsibilities.

Widespread changes in IT management would almost certainly alter the demand for particular types of IS expertise and reshape the roles and responsibilities of those traditionally employed in IS departments [25]. Most of the emerging practices can be a potential threat or a potential opportunity to IS specialists amidst shifting demands for an assortment of IS services and expertise. For example, Martinsons [26] suggested that outsourcing could dim the career prospects of IS specialists, but at least one study indicated that it boosted their employment status [15]. After outsourcing, IS specialists were found to enjoy better training, higher salaries, and more job stability.

Even though our understanding of these five practices and their consequences remains incomplete (and perhaps contentious), each is likely to affect the community of IS specialists. In extreme cases, adoption of a practice could lead to the dismantling or reorganization of a centralized IS department [23,34]. More generally, pressures for greater end-user autonomy and flexibility must be balanced with the needs to maintain control and efficiency [38]. Related to this, there is a danger that IS departments could become victims of their success, with their traditional work becoming “almost incidental” in the modern business [44].

A recent study sought to examine the dynamic situation from the perspective of the IS specialist. It investigated the perceptions and attitudes of IS specialists in Hong Kong, London and New York City towards the five aforementioned practices. This paper begins by briefly reviewing the literature on the relevant practices and the nature of IS specialists. It then outlines the research framework before reporting and discussing the findings from Hong Kong. Additional results from the study, including a comparison across the three locations, are reported elsewhere. This paper concludes by considering the implications of the study for the management of both IS and human resources, and recommending specific areas for further research.

2. Literature review

The trends towards downsizing, client–server architectures, and open systems significantly affect both the nature of IS activities and the ways in which IS specialists work [35]. There is some evidence to suggest that IS specialists are unenthusiastic about new technologies. For example, Rose [41] found that many managers of IS development groups had become single-dimension performers, steeped in the old ways of doing things. They had proprietary feelings towards the IS that they had built, and preferred to maintain rather than rebuild them. Their limited interest in considering new methodologies and technologies constituted a major barrier to change. By the early 1990s, changes in the IT environment were already impairing the performance and job satisfaction of IS specialists [39,48].
The critical skills for designers and programmers are known to be very different from those required to support EUC or office automation [43]. For example, end-user support people should have strong interpersonal skills and a broad range of technical and business operations knowledge. In contrast, central computing specialists usually support only one or two technologies or applications and they need to be intimately familiar with these. Not surprisingly, IS specialists who support end-user computing often experience role conflict and/or role ambiguity [17]. Similarly, outsourcing can refocus the activities of the internal IS group from performing IS activities to monitoring subcontracted work, with senior staff negotiating and administrating contracts with external parties rather than managing their own projects and personnel [26].

End-users increasingly want IS specialists to deliver solutions by acting as knowledgeable consultants [41]. This suggests that IS specialists need to move away from a technology-dominated mind set and enhance their understanding of business needs and human factors [31]. The benefits of increased collaboration with vendors (rather than a continued reliance on self-developed solutions) and better marketing of IS services and expertise have also been noted [36,41].

The willingness and capability of IS specialists to act on such prescriptions is debatable. Based on a few interviews, Pastore [40] concluded that computer programmers favoured certain changes, such as BPR and the migration to client–server architectures. However, they expressed concern about a lack of management support in terms of motivation, training, user integration, and evaluation. Meanwhile, a Software and National Competitiveness study report released by the Canadian Employment and Immigration Department found serious skills shortages at MIS departments across the North American continent [24].

In order to retool the IS workforce, it is suggested that IS specialists first update their technical skills, then move from hierarchical-based to team-based organizations, and finally shift their focus from technical issues to business partnerships [41]. Retooling is thus more than a technological issue; attributes such as business knowledge, interpersonal skills and marketing ability also become critical. This is true not only in North America, but all over the world.

2.1. Previous research in Hong Kong

Business knowledge, interpersonal skills and system analysis capabilities were found to be the most valued competencies for programmers and analysts in Hong Kong [44]. Environmental/platform and computer languages competencies were perceived to be less important. Since programming has remained the primary emphasis of IS curricula in Hong Kong [5], the skill sets of the IS graduates there seem to address short-term needs rather than long-term ones.

Hong Kong IS managers have also expressed a preference for training their staff in areas that are directly associated with their current duties [2–4]. However, both analyst/programmers and programmers tend to cite the skills needed for promotion (e.g. project management) as their top training needs. This cumulative evidence suggests that Hong Kong has overemphasized technical skills while giving inadequate consideration to overall growth skills (see also [12,37]).

2.2. Growth and social needs of IS professionals

Given the recent changes in IS practice, it is significant that pioneering studies of computing personnel in the United States revealed their tendency to be driven by growth needs rather than social needs [9,10]. Computing personnel espoused a high need for achievement and a willingness to tackle new challenges at work, including those involving state-of-the-art technologies. However, they had a comparatively low need for social contact and interpersonal activities, expressing a preference to concentrate on technical tasks.

Subsequent studies extending this line of research reinforced many of the original fundings (see [6,16]) and indicated that data processing specialists differ from other professions in terms of both their perceptions and expectations [46,47]. They also related specific factors to the job satisfaction of both analysts and programmers while confirming their high needs for achievement and growth and willingness to undertake roles that involve boundary spanning across departments or organizations [1].

More recently, a study of motivational factors for IS personnel in Hong Kong was reported [2]. The mean growth needs strength (GNS) for three different job
types in Hong Kong did not differ significantly from American norms. However, the mean social needs strength (SNS) score of IS specialists in Hong Kong was significantly higher than in the United States. Moreover, their social needs related largely to peer-level interactions rather than the development of employee–manager relationships. IS specialists in Hong Kong also scored higher on communication apprehension, preferred to act as communication receptors rather than expressers, and expressed stronger agreement with the idea of “wanting others to control and influence them” [2].

2.3. What we do not know

Previous studies have profiled IS specialists in the United States and Hong Kong, but we are left to wonder about their perceptions and attitudes in a dynamic environment, and specifically amidst the transformation of IT management. To date, the literature on practices such as downsizing, end-user computing, outsourcing, and re-engineering has emphasized the financial and managerialist perspectives. Less is known about how the IS community perceives and is affected by these practices. It is possible that IS specialists would: (1) seek to retain a dominant role with IT applications; (2) relinquish control of smaller, peripheral systems, but keep their responsibilities for larger, core applications; or (3) become marginalized.

The ability of existing IS specialists to foresee the impact of, and to prepare for the potential changes stemming from emerging practices, may be seen as critical to the future of the IS function. Even if IS specialists recognize the need for new technologies and management practices, they may resist them due to concerns about either losing control to the end-users or being able to support them effectively. Therefore, the attitude towards change of IS specialists can be expected to affect IS success. Recent studies (see [8,22,45]), suggest that both perceptions and attitudes will depend on the gender and tenure of the IS specialist.

2.4. A tentative line of reasoning

Based upon first-hand observations and a review of the professional literature, a tentative line of reasoning emerged over time. With lengthy backlogs and growing number of requests for applications development and enhancement, IS specialists tend to spend long hours simply doing their existing jobs. The lack of time and/or opportunity to become familiar with new tools and technologies would be a growing source of frustration, particularly since the migration of existing IT applications to different hardware platforms could impair promotion prospects and even job security. As a result, it is expected that IS specialists will have significant concerns with respect to the adoption of a new practice.

However, individuals with more seniority or predominantly managerial (rather than technical) responsibilities may be less affected by, and concerned about these developments [22]. He reasons that technological prowess is less enduring than management expertise. Consequently, new generation technologies and changes in IT management practice will be a bigger concern to relatively junior staff, although the behaviours and performance of all IS specialists may be affected.

This line of reasoning was tested empirically in the Hong Kong-based study that is reported here. The reported research was part of a broader effort to further our understanding of the perceptions and attitudes towards a number of emerging technologies and practices, such as downsizing, EUC, outsourcing, CASE-based development, BPR and Internet-based computing, that are transforming the fundamental nature of IT management.

3. Research framework

3.1. Objectives

It was considered important to know:

- how emerging practices, such as downsizing, EUC, outsourcing, CASE-based development, and BPR, are perceived by IS specialists;
- the attitudes of IS specialists towards these practices;
- the influence of experience and gender on these attitudes;
- how these practices affect the roles and responsibilities of IS specialists;
the perceived requirements to implement IT management changes effectively; and, more generally,
the extent to which IS people are satisfied with their jobs and training.

3.2. Methods

A research instrument was developed specifically to investigate the aforementioned issues. The questionnaire, which enabled time- and cost-effective data collection from a large sample, consisted of three parts: (1) job and career attitudes; (2) attitudes and expectations towards emerging IT management practices; and (3) personal data. The second part of our instrument concentrated on the following phenomena: downsizing, EUC, outsourcing, CASE-based development, and re-engineering. Each was included because of its international popularity and (potentially) significant impact on IS development and/or IT application.

With many organizations considering or already implementing some or all of these practices, respondents were expected to be able to provide well-informed answers. Nevertheless, a brief definition of each concept was included in the questionnaire in order to ensure a common understanding among the respondents. The decision to include only the aforementioned five practices admittedly limits the scope and utility of the study, and so we would encourage further research to consider other practices.

Most of the questions asked respondents to provide ratings on a Likert scale, where 1 meant strongly disagree or very insufficient, and 5 meant strongly agree or very sufficient. In order to raise the response rate and to simplify the subsequent data analysis, no open-ended questions were asked, and the respondents were not required to provide any comments or explanations. Minor modifications to the questionnaire were made after pre-testing it with graduate students and IS practitioners in Hong Kong, London and New York.

3.3. Data collection

Primary data was collected in Hong Kong. The choice of this modern international business centre was expected to increase the generalizability of the findings. It also enabled this study to build on a considerable body of scholarship (see [3,27,28,37,45]). It is recognized that both institutional and cultural factors could have influenced the results. For this study, the IT policies of the Hong Kong Government (see [30]), the dominant societal culture (Hong Kong Chinese), and the corporate cultures of the sampled organizations are potential influences. Significantly, Martinsons and Westwood [32] advanced a theory to account for the distinctive pattern of IT application, especially at the management level, in the Chinese business culture. Therefore, it is vital to consider the research context when interpreting the results.

Questionnaires were distributed to IS professionals in a number of private companies and public agencies. Cluster sampling, in which groups (rather than individuals) are randomly selected from an appropriate population, was used. The sample was drawn from those working in centralized IS departments having more than 30 people. All questionnaires were issued and collected within a 4 week period in 1995. Resource constraints and the rarity of large organizations in the Hong Kong economy encouraged this approach. Questionnaires were delivered to a liaison person in each IS department who then distributed the questionnaires to departmental colleagues.

A total of 150 questionnaires were issued together with a covering letter explaining the study and a self-addressed envelope. Completed questionnaires were returned directly to the research team and anonymity was assured. Consequently, respondents were expected to provide genuine responses to even the most sensitive questions, such as those related to job dissatisfaction, preferred job elements, skills shortages, and personal weaknesses. The return of 80 completed questionnaires yielded a response rate of about 53%. The fairly high response rate can be partly attributed to issuing all the questionnaires by hand.

4. Results

4.1. Profile of the respondents

The response rates from each of the eight organizations are shown in Table 1. Meanwhile, the sizes of the IS departments that were represented in the study are shown in Table 2. Consistent with Chiu [8] and Iivari [22], the respondents were divided into sub-samples
based upon their gender and IS experience (see Table 3). The respondents had worked in their existing departments for periods ranging from 6 months to 15 years. Five years was the dividing line between the two sub-samples based on experience.

### 4.2. Attitudes toward the emerging IT practices

The degree of support for the emerging practices is shown in Table 4. The measure was set at a 5-point Likert scale with 5 being “strongly support” and 1 being “strongly against”. End-user computing, downsizing, re-engineering and CASE-based tools received significantly stronger support than outsourcing.

One-way ANOVA analyses using F-tests with $p < 0.05$ were used to analyse differences between sub-samples. Differences between experienced (more than 5 years in the field) and inexperienced (less than 5 years) IS specialists as well as between female and male IS specialists were identified. Working
experience was found to be strongly correlated with the willingness to support EUC, outsourcing, and BPR. Experienced IS specialists favoured each of these practices more than their less experienced counterparts. Meanwhile, female IS specialists expressed significantly less support for BPR and significantly more support for EUC and outsourcing than their male counterparts. For downsizing and CASE tools, the differences between experience levels and genders were insignificant.

Paired t-tests were used to identify significant differences in the IS specialist attitudes towards the practices. As indicated in Table 5, the respondents expressed the most support for downsizing and the least for outsourcing.

### Table 5
Comparison of attitudes towards the emerging practices

<table>
<thead>
<tr>
<th>Paired student t-tests</th>
<th>Student t-value</th>
<th>Significant difference</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Downsizing vs. end-user computing</td>
<td>2.62</td>
<td>Yes</td>
<td>DWNS &gt; EUC</td>
</tr>
<tr>
<td>Downsizing vs. CASE development</td>
<td>2.84</td>
<td>Yes</td>
<td>DWNS &gt; CASE</td>
</tr>
<tr>
<td>Downsizing vs. outsourcing</td>
<td>5.29</td>
<td>Yes</td>
<td>DWNS &gt; OUTS</td>
</tr>
<tr>
<td>Downsizing vs. re-engineering</td>
<td>1.46</td>
<td>No</td>
<td>Nil</td>
</tr>
<tr>
<td>Re-engineering vs. end-user computing</td>
<td>1.20</td>
<td>No</td>
<td>Nil</td>
</tr>
<tr>
<td>Re-engineering vs. CASE development</td>
<td>1.66</td>
<td>No</td>
<td>Nil</td>
</tr>
<tr>
<td>Re-engineering vs. outsourcing</td>
<td>4.08</td>
<td>No</td>
<td>BPR &gt; OUTS</td>
</tr>
<tr>
<td>End-user computing vs. CASE development</td>
<td>0.31</td>
<td>No</td>
<td>Nil</td>
</tr>
<tr>
<td>End-user computing vs. Outsourcing</td>
<td>3.39</td>
<td>Yes</td>
<td>EUC &gt; OUTS</td>
</tr>
<tr>
<td>CASE development vs. outsourcing</td>
<td>4.33</td>
<td>Yes</td>
<td>CASE &gt; OUTS</td>
</tr>
</tbody>
</table>

*a At \( p = 0.05 \) (95% confidence level).

4.3. Perceived impact of the emerging IT practices

After determining the degree of support for the practices among IS specialists, their perceived impact was examined. Respondents were asked about the practices that they expected in the near future. Again, the measure of agreement or disagreement is set at a 5-point Likert scale, with 1 representing *strong disagreement* and 5 representing *strong agreement*. The results in Table 6 indicate that IS specialists perceived that interpersonal, technical support, and system analysis/design skills will all become more important if the emerging practices are widely adopted.

There was a strong consensus that IS specialists would need to enhance (or perhaps modify) their skill

### Table 6
Perceived impact of the emerging practices (1: strongly disagree and 5: strongly agree)

<table>
<thead>
<tr>
<th>Changes</th>
<th>EUC</th>
<th>BPR</th>
<th>Outsourcing</th>
<th>Downsizing</th>
<th>CASE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interpersonal skills rise in importance</td>
<td>3.63</td>
<td>3.68</td>
<td>3.73</td>
<td>3.56</td>
<td>3.50</td>
</tr>
<tr>
<td>Technical skills decline in importance</td>
<td>2.39</td>
<td>1.98</td>
<td>2.88</td>
<td>1.90</td>
<td>2.56</td>
</tr>
<tr>
<td>System analysis and design skills decline in importance</td>
<td>2.58</td>
<td>1.90</td>
<td>2.86</td>
<td>1.97</td>
<td>2.66</td>
</tr>
<tr>
<td>Significant numbers of IS specialists will lose their jobs</td>
<td>2.35</td>
<td>2.02</td>
<td>2.67</td>
<td>2.06</td>
<td>2.68</td>
</tr>
<tr>
<td>I may lose my job</td>
<td>1.93</td>
<td>2.23</td>
<td>2.41</td>
<td>2.07</td>
<td>2.18</td>
</tr>
<tr>
<td>Essential to learn significantly different skills</td>
<td>3.44</td>
<td>2.97</td>
<td>3.09</td>
<td>3.57</td>
<td>3.49</td>
</tr>
<tr>
<td>Significant change in job duties</td>
<td>3.01</td>
<td>2.38</td>
<td>3.17</td>
<td>3.33</td>
<td>3.29</td>
</tr>
<tr>
<td>Significant loss of power</td>
<td>2.77</td>
<td>2.18</td>
<td>3.64</td>
<td>2.26</td>
<td>2.44</td>
</tr>
</tbody>
</table>

*a Those with less than 5 years of experience had a significantly higher score than those with 5 or more years of experience.
*b Those with less than 5 years of experience had a significantly lower score than those with 5 or more years of experience.
*c Females had a significantly higher score than males.
*d Females had a significantly lower score than males.
sets in order to support the emerging practices. Many also believed that some changes in job duties would occur. However, few expected to lose either their jobs or their power and control over end-users. The findings indicate that most IS specialists did not believe that the emerging practices, with the exception of outsourcing, would have an adverse effect on them. This may explain their comparative willingness to support the other four practices.

The respondents, and particularly the less experienced sub-sample, did not perceive that changing practices would reduce the importance of technical skills. As shown in Table 7, they believed that downsizing would have the greatest impact on technical and programming skills. It would increase the importance of both skills in the future.

### 4.4. Career preferences and important IS skills

The respondents were also asked to rank their preferred job element for the next 1–3 year period. A score of 5 was to be given for the first preference, 4 for second, 3 for third, 2 for fourth, 1 for the fifth, and 0 for the rest. The average rankings are shown in Table 8.

*System analysis and design* and *project management* were found to be the preferred job elements of inexperienced and experienced IS specialists, respectively. The difference of scores between these first two choices was significant in both groups. The findings also indicate that most IS specialists want to follow a traditional career development path — from programmer through analyst to project manager. Both inexperienced and experienced IS people enjoyed *network design and management*, but disliked *PC and end-user support* as well as *maintenance programming*. Personnel management and sales and marketing also ranked low among their preferences.

The responding IS specialists were divided into four groups (inexperienced males, inexperienced females, experienced males and experienced females) in order to test for gender and experience differences. As shown in Table 9, male IS specialists had a significantly greater preference for *network design and management* than their female counterparts. The

### Table 7

<table>
<thead>
<tr>
<th>Comparative importance of technical skills for emerging practices</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>t-Value</strong></td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td>Downsizing vs. end-user computing</td>
</tr>
<tr>
<td>Downsizing vs. CASE development</td>
</tr>
<tr>
<td>Downsizing vs. outsourcing</td>
</tr>
</tbody>
</table>

### Table 8

<table>
<thead>
<tr>
<th>Preferred job elements of experience sub-samples — scores and rankings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Job element</strong></td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td>Personnel management</td>
</tr>
<tr>
<td>Project management</td>
</tr>
<tr>
<td>Analysis and design</td>
</tr>
<tr>
<td>Development programming</td>
</tr>
<tr>
<td>Maintenance programming</td>
</tr>
<tr>
<td>Network management</td>
</tr>
<tr>
<td>PC or end-user support</td>
</tr>
<tr>
<td>Consulting/training/teaching</td>
</tr>
<tr>
<td>Strategic IS planning</td>
</tr>
<tr>
<td>IS management and support</td>
</tr>
<tr>
<td>Sales and marketing</td>
</tr>
<tr>
<td>Product evaluation</td>
</tr>
</tbody>
</table>

### Table 9

<table>
<thead>
<tr>
<th>Preferred job elements of gender sub-samples — scores and rankings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Job element</strong></td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td>Personnel management</td>
</tr>
<tr>
<td>Project management</td>
</tr>
<tr>
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<tr>
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</tr>
<tr>
<td>Sales and marketing</td>
</tr>
<tr>
<td>Product evaluation</td>
</tr>
</tbody>
</table>
reverse was found for project management. Less experienced females also preferred to do personnel management while more experienced females had a comparatively higher preference for product evaluation than experienced males. These findings suggest that there are significant gender differences in job preferences. Additional sampling would enable more definitive conclusions to be drawn.

The respondents were asked to rank the importance of required IS skills both currently and in 3 years time. The results (shown in Table 10) indicated that system analysis and design was perceived to be the most important skill by the less experienced IS specialists. Meanwhile, the most important skills for experienced IS people were project management, interpersonal skills, and business knowledge. This suggests that consistent with their general wishes, the respondents could follow a traditional career path, moving from programmer to analyst, and then to project manager.

4.5. Roles, skills and training

IS people may support the changes resulting from emerging technologies and IT management practices, but will they initiate the changes? Do they feel that they have the skills to cope with these changes? In order to find out, the respondents were asked these two questions. The results, shown in Table 11, indicate that the less experienced sub-sample did not agree that they would be the ones to initiate changes. Even the more experienced sub-sample of IS specialists were split on whether they will be among those introducing changes in their companies.

To determine the job attitudes of IS people, respondents were asked to rank their job dissatisfaction factors. Numbers from 5 to 1 were progressively allocated to the most important factors. The results, shown in Table 12, suggest that insufficient compensation and poor promotion prospects were key sources of dissatisfaction. Training and exposure to new technologies were more important to less experienced IS specialists while more experienced ones stressed the need for good management.

The survey also considered the degree of satisfaction with both the current job and the training provided by their organization (see Table 13). Again, the measure was set as a 5-point Likert scale. Most IS specialists indicated that they lacked sufficient training to meet the professional challenges they expected. A Pearson test was employed to determine the

<table>
<thead>
<tr>
<th>Skill</th>
<th>Less experienced sub-sample</th>
<th>More experienced sub-sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Current</td>
<td>Next 3 years</td>
</tr>
<tr>
<td>Business knowledge</td>
<td>3.51 (5)</td>
<td>4.68 (4)</td>
</tr>
<tr>
<td>Interpersonal skills</td>
<td>4.81 (3)</td>
<td>4.79 (3)</td>
</tr>
<tr>
<td>Project management</td>
<td>3.19 (6)</td>
<td>5.04 (2)</td>
</tr>
<tr>
<td>Personnel management</td>
<td>1.64 (8)</td>
<td>2.57 (7)</td>
</tr>
<tr>
<td>Systems analysis and design</td>
<td>5.83 (1)</td>
<td>6.21 (1)</td>
</tr>
<tr>
<td>Programming (languages)</td>
<td>5.74 (2)</td>
<td>2.81 (6)</td>
</tr>
<tr>
<td>Platform, operating systems</td>
<td>4.57 (4)</td>
<td>3.53 (5)</td>
</tr>
<tr>
<td>Software packages</td>
<td>2.66 (7)</td>
<td>2.47 (8)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Issue</th>
<th>Less experienced sub-sample</th>
<th>More experienced sub-sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean score</td>
<td>S.D.</td>
</tr>
<tr>
<td>Predictability of change</td>
<td>2.41</td>
<td>0.92</td>
</tr>
<tr>
<td>Desire to initiate change</td>
<td>2.35</td>
<td>0.88</td>
</tr>
<tr>
<td>Skill set sufficiency to cope with expected change</td>
<td>3.21</td>
<td>0.78</td>
</tr>
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</table>
relationship between job satisfaction and training satisfaction. Training satisfaction was found to be significantly related to job satisfaction among the less experienced and female sub-samples, but not that more experienced and male sub-samples. Both females and less experienced specialists were also more concerned with their training than their male and more experienced counterparts, respectively.

5. Discussion and implications

As assorted IS responsibilities are transferred to end-users or contracted out, the roles of those in traditional IS departments are changing. Our findings indicate that many of these changes associated with the emerging approach to IT management will face strong resistance from IS specialists. This resistance was related to several different factors, the most prominent being worries about career progression. The respondents expressed a strong desire to follow a traditional IS career path — from programmer through analyst and project manager to unit manager. This and other findings from our study raise a series of issues for discussion.

5.1. End-user computing: supporting change from a distance

The success of end-user computing hinges on effective user education and on-going support from technical staff. However, our results show that PC and end-user support are low preferences among both junior and more experienced IS specialists. While many IS specialists favour the EUC concept in general terms, they are unenthusiastic about acting as EUC support staff or undertaking consulting, teaching and training. Less experienced IS specialists appear to believe that end-user support activities will do little to enhance their future promotion prospects.

Many less experienced IS specialists aspire to be systems analysts. However, few of them perceive that they will acquire the appropriate skills for such a promotion by teaching or supporting end-users. IS specialists may also be unwilling to act as end-user supports because it is a routine (and boring) activity
and there are usually large number of end-users. The typical end-user may be expected to have limited IT knowledge and/or an unfavourable attitude towards computers. Like maintenance programming, even if EUC support is done very well, the contribution may not be recognized. Conversely, superiors are likely to receive complaint letters or calls as a result of unsatisfactory performance in this area. This highlights the importance of providing performance feedback to IS specialists.

Experienced IS specialists were more positive about the trend towards EUC. They were also less inclined to believe that EUC will significantly change their job duties. Their own responsibilities would continue to focus on management areas (coordination, creating standards and making policy) instead of performing front-end call answering and trouble shooting. The latter tasks would probably be taken up by more junior employees, such as their subordinates.

With the proliferation of software packages and hardware, users may have escalating difficulties as they select among available IT tools. If they are allowed to select whatever software and hardware they want without professional advice, problems related to product performance, technical support and systems compatibility may be expected. IS specialists can provide valuable assistance to end-users in the selection of hardware and software. They can also help to define and enforce technical standards that reduce or eliminate subsequent IT management problems. “You have to have standards in hardware, software and methodologies. You cannot support everything” [41]. Thus, product evaluation and knowledge of software packages remain very important. However, our findings indicate that product evaluation ranked only seventh in terms of preferred job elements while software package skills ranked as the least and second least important skills by inexperienced and experienced IS specialists, respectively.

The results further suggest that IS specialists are reluctant to take up the software selection responsibilities. This may reflect the difficulties in making a good software selection decision due to the unpredictability about which technologies or standards will survive. There are many software packages available in the marketplace and new ones are being introduced all the time, and is difficult to remain familiar with all their pros and cons, the evaluation and recommendation process for a specific application will involve considerable amounts of time and effort.

In fact, most software selected to satisfy current needs will constitute a sub-optimal, longer-term choice, especially in light of the short software product life cycle. IS may be unwilling to take up software selection responsibilities, and give a very low ranking to software package skills, because of a perception that their expertise will quickly become outdated. The IS specialists expressed little enthusiasm for providing computer training to end-users or assisting them in selecting suitable hardware and software. This begs the question: how can EUC be implemented successfully? If IS specialists dislike tasks such as end-user training and product evaluation, it is also unclear how they can claim to be supportive of end-user computing? Further research would be needed to answer these questions.

5.2. Outsourcing and IS career prospects

Out of all the practices considered in this study, the consideration of outsourcing most clearly indicates that management is dissatisfied with the performance (or the return on investment) of the internal IS function. Outsourcing signals a belief that an outside party has the economies of scale and/or expertise to provide superior IT products and services. Whether this is simply a cost saving measure or a vote of non-confidence in the internal IS specialists, it does commonly change their organizational role. After outsourcing, these specialists will have to focus more on monitoring contracted work, to ensure the satisfactory performance of external parties, instead of performing the work themselves. Outsourcing may also reduce an organization’s need for its own analysts and programmers. Given the preferences for a traditional career path found in this study, many IS specialists may leave in the belief that the decision to outsource has dimmed their promotion prospects.

Outsourcing is also likely to create new job requirements and a major role change for IS department staff. The skills of monitoring contracted work, dealing with outsourcing vendors, and being a coordinator between users and vendors differ greatly from those needed to develop and implement an IS. This may explain why our respondents were less enthusiastic about outsourcing than the other practices considered here.
5.3. Technical-orientation versus people-orientation

Network design and management were highly ranked among the job preferences of the IS specialists. Job elements that require a lot of interpersonal communication, such as end-user support and sales and marketing received a much lower ranking. This may be explained by reference to the results of previous studies. IS specialists perceived themselves to be very technically competent and have high growth needs [9,10]. In order to maintain their professional image, they may prefer to do technical tasks, like network design and management. The respondents, and particularly the male sub-sample, were less comfortable with activities that involved interpersonal communication and personnel management. Training programs that concentrate on programming skills, regardless of the specialist’s eventual career path, would exacerbate this imbalance. Training that includes non-technical areas holds promise, but again more research is suggested in order to prescribe specific remedies.

Our results show that IS people prefer network management significantly more than other technical-oriented tasks, such as product evaluation. It may be that network design and management can satisfy the growth needs of IS people. Many emerging IT practices, such as end-user computing and downsized applications depend on fast and reliable network operations. Therefore, network design and management has become a critical and high-profile task. Data communication and networking are also becoming more important. Many vendors have put a lot of money into research and development and new IT products are frequently rolled out. Therefore, network designers and support personnel continually test and use leading-edge technologies, and retain a high status as well as attractive levels of compensation and a high degree of job security in their present organizations.

5.4. Downsizing

Among the emerging practices considered in our study, the IS specialists were the most supportive of downsizing. They perceived that downsizing was the practice least likely to result in the declining importance of technical-oriented activities, especially those that they enjoyed doing. This is consistent with earlier research which found that IS people prefer technically oriented activities because of their high growth needs and low social needs [2,9,10].

Why might IS people perceive that technical skills will remain important after downsizing? With the introduction of a client–server or LAN-based configuration, applications will run in two or more machines, instead of a single machine. This will create new problems that will not occur in stand-alone applications. These may include distributed database management, absence of shared memory, communication bandwidth limitation, synchronization of activities, error detection and recovery and problem isolation. It will be more challenging to ensure data integrity and security as well as satisfactory applications performance and availability under a client–server architecture than in a centralized environment. Good client–server applications are thus perceived to be more difficult to build.

The results do indicate that most IS people recognize their need to acquire new skills in order to effectively support downsizing. This implies that many do have a insufficient skill set at present. However, they strongly disagreed with the statements, I may lose my job and Many IS specialists will lose their jobs. This could reflect a strong belief their own technical competence and future learning capabilities or unjustified optimism.

In Canada, BPR had a significant effect on the IS profession as many corporations began to limit their full-time IS employees and hire more people on an as-needed basis [24]. Although few IS specialists were forced to make career changes, many others significantly upgraded their skills in order to help ensure their existing jobs.

Our results indicate that few IS specialists in Hong Kong believe that they will lose power over end-users. They perceived client–server applications to be more difficult, both to implement and to maintain. As a result, they expected users to be more reliant on them in the future. This is consistent with Savoia and Jordan [42], who indicated that end-users and the centralized IS department would need to be active partners in order to implement client–server applications successfully. If the centralized IS department exercises a high degree of control, and user participation is neglected, it will be difficult to implement downsizing successfully.
5.5. Initiating changes and re-engineering processes

Even our sub-sample of experienced IS specialists in Hong Kong did not perceive that they will initiate major organizational changes. Perhaps it is because they have worked in a comparatively reactive mode. Top management has almost always initiated IT-enabled change in Hong Kong [3]. The traditional duties of central IS departments have been to implement management directives. Consistent with the Chinese business culture [32], senior line managers make the decisions while IS specialists simply follow their directives.

As end-users gain more IT-related skills and knowledge, their reliance on centralized IS departments could progressively decrease. Dissatisfaction with the services provided by IS specialists could accelerate such a trend. Given this scenario, the IS function can continue to add value not only by foreseeing the potential of new IT applications, but also by actively planning and implementing appropriate changes.

5.6. Future uncertainties and skill deficiencies

Our results indicate clearly that IS specialists are worried about having a skill set that is sufficient to cope with future IT-related challenges. Perhaps it is because they cannot foresee which information technologies will be adopted by their employers in the future. Most respondents indicated that their current skills were insufficient to support specific emerging practices, and that they need considerable training in order to support many of the potential changes accompanying them. This implies that IS specialists are both uncertain about future IT trends and concerned that they will lack the skills to meet the challenges that are likely to emerge.

The transition from centralized electronic data processing to EUC also shifts the emphasis of IT from technology to information (see [11]). Many IS staff are comfortable with traditional systems development methodologies due to their programming, systems analysis, and project management skills. However, their limited interpersonal and information management skills as well as a lack of business and broad technical knowledge may constrain their ability to cope with the emerging needs of end-users.

5.7. Technological advances and IS training

The respondents expressed a high degree of job dissatisfaction. For junior IS department staff, a lack of training and little exposure to new technology were the two major reasons for this dissatisfaction. This sub-sample felt that their training was insufficient to meet future IT needs. They wanted more training and more exposure to new developments in IS-related areas. They had higher growth needs and/or expectations than their more experienced counterparts, were more eager to be promoted, and more dissatisfied if they could not acquire new IT knowledge. Skill deficiencies will clearly hurt their promotion prospects. This line of reasoning closely links current training and development activities to future earnings and job satisfaction.

IT is changing at an ever increasing rate. However, the absence of a longer-term perspective may pose a threat to some IS departments. Many Hong Kong IS managers prefer their staff to be trained in areas that are directly associated with their current duty [2,3]. As a result, IS training is seldom oriented to meet future IT needs [5]. Moreover, many IS specialists were swamped by application backlogs. Consequently, they had little exposure to new IT or opportunity to engage in activities that would enhance their skill sets.

5.8. Foreseeing and preparing for change

Our findings indicate that few IS specialists believed that they will lose their jobs or control over end-users in the future. They did foresee minor changes in job duties and the need to learn new skills. However, they did not expect the demand for IS specialists to decrease or their professional image and power over users to decline. Significantly, other studies [5,7] suggested that the future success of IS specialists in information age economies like Hong Kong will depend on their: (1) preparation for inevitable changes; (2) comfort with emerging technologies and IT management concepts; (3) ability to initiate changes as opportunities arise; and (4) capability for continuous learning and improved performance. Ignoring or overlooking the impact of changes in either business or technology will lead to negative long-term consequences. Unfortunately, our findings suggest that many IS specialists are unaware of or ill-prepared for these changes.
5.9. Gender differences among IS specialists

Many of our findings could have been reasonably expected. For example, it is very natural for in-house IS specialists to resist outsourcing. In contrast, the extent of the differences between female and male respondents surprised the research team. Even with our limited sample size from Hong Kong, the data analysis revealed significant gender differences.

These differences may be related to the masculinity/femininity dimension of culture identified by Hofstede [20]. While a useful and promising line of inquiry has been initiated [8], we would invite others to advance theories to explain what we have found, and to conduct further research that could confirm or refute our preliminary findings. Traditionally, IS has been a male-dominated field. However, females represent a growing percentage of the computer science and information technology graduates that are joining the field. Therefore, it is important to understand how their values, attitudes and behaviours may differ from past or present norms.

6. Summary and conclusions

The sampled IS specialists from Hong Kong were supportive of the emerging IT practices with the notable exception of outsourcing. However, a vast majority of the respondents indicated a desire to follow a traditional IS career path — progressing from programmer through analyst to project manager. They expressed a strong preference for design and analysis activities in comparison to end-user support and product evaluation. More generally, they preferred technically oriented tasks more than people-oriented ones. This is consistent with previous studies that found high growth needs and low social needs among IS specialists in both Hong Kong and the US.

Relatively few of the sampled IS specialists believed that their current roles and responsibilities would be altered significantly by new practices in IS management. Moreover, a majority expressed their personal reluctance to change those roles and responsibilities. However, the respondents did share a common perception that their current skill sets were inadequate to meet the professional challenges that were emerging. They were dissatisfied with their training, and felt that their level of exposure to new technologies was insufficient. Many were reluctant to introduce IT-enabled changes due to their fear of failure. In order to successfully implement advanced IT applications, it appears that there is a need for many organizations in places like Hong Kong to address the skill gaps and promote attitudinal changes among IS people.

Due to the rapid and unforgiving nature of IT-related changes, and the consequences of falling behind, there is now an imperative to master new technologies as they emerge. This implies a need for more proactive IS specialists. Building IT applications can no longer be their only significant role. They must also focus on the business needs of their organizations, identify appropriate IT-related solutions, and be active in the planning and implementation of those solutions.

Outsourcing is not only useful to solve the shortage of IS specialists, but also can enable internal IS staff to focus on higher value-added activities. The sampled IS specialists expressed a willingness to support IT management changes, but they did not feel that they had the skills to effectively implement those changes. Few were prepared to take the initiative. Their responses were consistent with high growth needs and an unfulfilled desire to use the leading-edge technology in their work. Thus, it was not surprising that insufficient training and little exposure to new IT are important job dissatisfaction factors.

7. Recommendations for IS management

The support of IS specialists is commonly considered to be a critical factor in the successful implementation of IT-enabled business changes. Consequently, it is important to ensure that these individuals possess skill sets that enable them to contribute, and that they are motivated to do so. If IS specialists resist change or are unwilling to accept a role change, such as from system builder to integrator/coordinator, it is difficult to see how others could be convinced to accept IT-enabled changes. For example, end-user computing would be difficult to implement successfully if IS specialists were unwilling to provide the necessary training and support.

Based on the results of the reported study, it is deemed appropriate to conclude with some specific
recommendations. These recommendations aim to facilitate the introduction of the emerging IT practices and to smooth the on-going role change for IS specialists:

**Design appropriate performance appraisal and reward systems.** Since systems development is among the few IS tasks that leads to tangible outputs, IS specialists perceive it to be a high-profile activity where their accomplishments are recognized and their career prospects can be enhanced. Conversely, the respondents commonly perceived end-user support activities to be underappreciated and inadequately rewarded. More explicit goals and objective measures to evaluate the performance of all IS tasks would be one way to address this discrepancy. Solid performance evaluation criteria and effective feedback mechanisms would likely encourage IS specialists to accept tasks with less visible outputs. More specific studies could identify the best means to do so in different contexts.

**Promote job enrichment to satisfy growth needs.** With reference to the hierarchy of five needs: physical, safety, social, esteem and self-actualization [33], IS specialists will become dissatisfied if their jobs cannot satisfy their high needs for personal development and self-actualization. This is a serious concern given the common perception among IS specialists that areas such as end-user support offer limited exposure to new technologies and little chance of self-development. As suggested by Hackman [18], job enrichment mechanisms can be used to increase skill variety and task identity, promote employee “ownership” of their work, and close the gap between doing and controlling aspects of a task. However, the most important aspect of job enrichment may be the development of good customer relationships.

**Encourage relationships between IS specialists and their clients.** Most IS organizations were organized into traditional functions, and there was limited familiarity with cross-functional (overlapping) processes. Changes in business relationships are now forging closer links between systems developers and those managing and executing specific processes. IS specialists must understand the needs of their clients, whether they are internal or external to their own organization, and develop good working relationships with them.

**Enact goal-oriented training and development programs for IS specialists.** Effective human resource management systems clarify employee career paths (even if they are not traditional ones) and facilitate staff training and development consistent with these paths. IS people should not be exempted from this modern management practice. Gaps between the actual and expected performance of IS specialists has become common. This gap could be reduced if specific goal-oriented training was provided. Such training may include technical or programming topics, but would likely focus on business knowledge, interpersonal communication and personnel management.

**Involve IS specialists in planning and developing management systems.** The management systems and organizational structures of modern businesses are increasing supported by IT applications. It is thus imperative to integrate the strategic perspectives of top managers with the IT-related knowledge of IS specialists. The involvement of IS specialists in the planning and development stages of management systems would be beneficial.

**Promote environmental scanning to leverage resources.** IS specialists can make an important contribution by keeping abreast of what is going on within the organization and also outside of it. Building a new application is now only one of many ways to satisfy user information needs. Often these needs can be met by applications that have been developed elsewhere or using data that has been collected and processed previously. If insights from experience, useful data and even software code can be shared or purchased from outside, substantial resource savings are likely to be realized. Virtually cost-free sources on the Internet may meet certain organizational needs while commercially available information and software packages can be expected to save time and money in other cases. IS specialists can play a role in identifying and assessing potential sources for information, IT and related products and services.

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