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The Use of Technologies in the Recruiting, Screening, and Selection Processes for Job Candidates

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The results of a survey are presented which examined technology use in recruiting and selection in order to determine (a) what technologies are being used in HR, (b) HR managers' goals for using these technologies, (c) the extent to which these goals are being met, and (d) what organizational factors (e.g., organizational image) lead to adopting these technologies. We conclude that the use of HR technologies is in a state of flux with most organizations continuing to use a mix of traditional and technology-based HR methods. Furthermore, technology-based solutions are not necessarily a panacea for HR managers: nearly a third reported that their attempts to use HR technology have resulted in limited or moderate success.

Introduction

Advances in technologies have had a profound impact on the business practices of many organizational functions including financial systems, sales, marketing, and production. Only recently have we seen an increased interest in the use of information technologies (IT) in Human Resource (HR) practices such as personnel screening and selection. For example, Nike uses Interactive Voice Response (IVR) technology to screen applicants over the telephone, followed by computer-assisted interviews with selected applicants, and finally performs face-to-face interviews (Thornburg, 1998). Other organizations, such as Home Depot, BI-LO, JCPenny, and the US Department of Defense, use a variety of technologies for screening and selection, such as the telephone, IVR, and computer adaptive testing (Frost, 1997). Commercial applications designed to screen resumes for keywords are also widely available to organizations.

Although the potential for technology use is vast, researchers and practitioners know surprisingly little about the array of technologies being used in organizations or the extent to which these technologies are being used to recruit, screen and select employees. Accordingly, one of our main goals for this research was to provide a descriptive snapshot of the types of technologies currently being used in recruitment and selection in North America. Further to this goal, we wanted to examine the extent of technology use across the various stages of recruiting and selection including: (a) advertising positions, (b) receiving applications, (c) initial screening, and (d) final selection. In addition, we wanted to determine the extent to which HR departments used these technologies for staffing: (a) low-level or entry-level positions, (b) mid-level positions, and (c) high-level positions.

In addition to determining *what* technologies are being used, we had another objective of examining *why* HR managers were adopting these technologies. There are several factors that have been reported to contribute to the increased use of technologies for screening and selection. The first relates to potential cost savings. For example, Innovex reports reducing screening costs by half by using IVR in their screening process (Thornburg, 1998). The potential savings for selection processes may be even higher. For example, the average cost of interviewing candidates face-to-face at universities has been estimated to be $1700 per candidate (Cummings, 1993). This cost includes transportation, hotels, meals and other expenses associated with placing a recruiter on campus. This cost contrasts with an expenditure of $50 to $250 for a half-hour interview by videoconference (Cummings, 1993).

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These potential savings have led some large organizations, such as Procter & Gamble, to invest in videoconference technologies for campus recruiting (Chapman, 1999).

A second reported factor is linked to the increased globalization of the economy and labor market. To succeed in a competitive global marketplace, businesses are looking for the best and brightest employees, regardless of their geographical setting. Shortages of highly-skilled workers in areas such as computer science and engineering have created a strong demand for international recruiting (Laabs, 1998). However, searching the international marketplace for talent is an expensive enterprise. Many organizations are discouraged by the costs involved and others are forced to pay rather than risk losing business as a result of a shortage of skilled workers. The use of IT in screening and selecting applicants has the potential to significantly reduce costs while simultaneously expanding applicant pools (Cummings, 1993; Thornburg, 1998). Kroeck and Magnussen (1997), for example, found that organizations who were initially unwilling to travel to smaller or geographically distant universities were able to do so by using videoconference technology to conduct their interviews.

Another promise of increased use of IT in screening and selection has been the potential to reduce adverse impact for protected groups. Rater biases have been well documented for issues such as sex, race, weight and age (Gallois, Callan and Palmer, 1992; Graves and Powell, 1995; Lin, Dobbins and Farh, 1992; Pingitore, Dugoni, Tindale and Spring, 1994). Human raters are also prone to a host of decision making errors such as placing too much emphasis on early and negative information (Dipboye, Fontennelle and Garner, 1984; Dougherty, Turban and Callender, 1994; Macan and Dipboye, 1988, 1990, Phillips and Dipboye, 1989; Rowe, 1989). These rating biases and errors represent the potential for individuals responsible for screening and selection to consciously or unconsciously discriminate against protected groups or at least make poor decisions about applicant suitability. By removing or reducing the human element from the selection procedure, and introducing a standardized, impartial, technology solution, many hope that adverse impact can be significantly reduced or eliminated and more valid decisions made.

A final reason proposed for adopting various technologies in recruiting and selection processes is to improve the efficiency of the hiring system by automating processes such as resume screening. One of the potential benefits of increased efficiency is to shorten hiring cycles, thereby making the organization more responsive to applicants and better able to compete with other organizations for the best applicants who may otherwise be hired before a longer selection procedure is even completed. For example, several studies have found that delays in hiring can result in early applicant withdrawal from the selection process (e.g., Arvey, Gordon, Massengill and Mussio, 1975; Rynes, Bretz and Gerhart, 1991).

Obviously these reported reasons may not capture the full range of reasons that HR Departments have for adopting various technologies. Accordingly, another major aim of this research was to identify the goals that HR managers report for using these technologies. Furthermore, we also wanted to determine the extent to which these goals were being met through adopting these technologies. For example, it is important to know whether HR managers are realizing the benefits they envisioned when they purchased these technologies.

Although technology is rapidly changing the Human Resource function in many organizations, we know little about whether adopting these technologies has provided solutions to HR problems. Although anecdotes are readily available, we do not know whether these experiences are typical or whether extreme stories garner more attention. Therefore, further aims of this study were to determine (a) the goals that HR managers hoped to achieve with these technologies, (b) the extent to which these goals were being met through technology use, (c) the costs and issues that must be addressed while implementing these technologies, and (d) what factors predict the extent to which organizations invest in HR technologies.

Method

This study consisted of a web-based survey administered to a broad subset of HR managers who were members of the Society for Human Resource Management (SHRM). Before conducting the survey, we conducted in-depth interviews with six senior HR personnel from some of the world's largest and most influential companies. These interviews allowed us to discover the types of technologies used in leading companies and to identify critical issues related to technologies.

In February 2001, we designed the web-based survey to assess HR professionals' use of technologies with job candidates. To minimize the influence of priming effects, two versions of the survey were created by counterbalancing the order of data collected. The survey collected a wide variety of data from HR professionals representing 125 organizations. These professionals were sampled from members of the Society for Human Resource Management (SHRM) who had indicated that they were at the corporate level (as opposed to branch or regional level) and listed 'Employment/Recruitment' as their primary function. These SHRM members were emailed and asked to complete the web survey. Given the redundancy of personal and work email addresses in the SHRM database, it is impossible to estimate with any accuracy exactly how many individuals were sent emails, although our best estimate is that approximately 3000 were sent. Of these many were returned due to the address being out of date or changed. Despite extensive beta testing of the web site using a variety of browsers and platforms, several people

reported that they had difficulty with the web site and could not complete the online version. Hard copies of the surveys were sent to those people who reported having browser problems and a few of these were completed and returned.

Measures

Organizational and Participant Demographics. Respondents were asked to identify their organization's primary industry by choosing from a list of 17 industries identified by SHRM. Organization size was estimated by indicating the number of employees currently employed by the organization, choosing from six categories that matched the SHRM membership database (i.e., less than 100; 100–499; 500–999, 1000–2499, 2500–4999, 5000 and above). Another item asked respondents to estimate the number of employees in five years' time to get an estimate of the organization's growth rate. The job title of the person completing the survey was captured by choosing from 12 categories (e.g., Vice President, Director, Manager). Participants indicated their age category (e.g., 20–29, 30–39, 40–49, 50–59, 60+) and their gender, male (coded '1') or female (coded '2'). The highest education level completed by the participant was indicated by choosing from a list ranging from High School to PhD.

Current and Future use of Technology. Data were collected on the extent of use of traditional and technology-based HR methods across four stages of the recruiting/selection process including: (a) advertising methods, (b) receiving applications, (c) initial screening of applications, and (d) final selection decisions. In addition to capturing their current use of these methods, we also asked respondents to estimate the prevalence of these methods in their organizations in five years' time. These data were further categorized according to the level of applicant: low-level (e.g., entry level, clerical, technicians), mid-level (e.g., managers, professionals), and high-level (e.g., executives, VPs) positions. For the advertising and initial screening questions where multiple practices can be employed simultaneously (e.g., newspapers and web), respondents were asked to indicate the extent of use of each of the HR practices ranging from 'not at all' (1) to 'to a great extent' (7). For the applications received (e.g., through 'regular mail' and 'fax') and final selection decisions (e.g., 'face-to-face' or 'videoconference'), the participants indicated the percentage of applicants using various practices and methods for the final selection process, and the percentage applying to the organization using various methods.

Costs. Respondents were asked to provide information on the costs (in $US) their organizations incurred while adopting technology-based HR practices for application, screening, and selection processes, including costs for: (a) technologies, (b) people (HR), (c) people (Information Systems), and (d) other.

Goals for Using Technologies. In order to allow for the widest range of possible answers for goals, we provided six open-ended text boxes. The responses were later categorized and coded into seven distinct categories including: (a) Efficiency (e.g., 'reduce time to fill positions,' 'streamline the process'), (b) Enable New Screening Tools (e.g., 'online personality assessment', 'allows us to test for technical expertise'), (c) Reduce Costs (e.g., 'cut down on paper and copying use,' 'decrease costs to fill positions'), (d) Standardize HR System (e.g., 'centralization and standardization,' 'consistent information across candidates'), (e) Expand Applicant Pool (e.g., 'reach more qualified applicants,' 'wide reach – worldwide access to potential employees'), (f) Promote Organizational Image (e.g., 'project a hi-tech image,' 'present a consistent image of the company'), and (g) Increase Applicant Convenience (e.g., 'increase customer service for applicants,' 'make application procedure easier for applicant'). Immediately following the text boxes for goals, we asked respondents to indicate the extent to which each goal had been met on a seven-point scale ranging from 'not at all' (1) to 'to a very great extent' (7).

Unintended Effects. Participants were provided with open-ended questions pertaining to any unintended benefits or disadvantages of adopting these technologies in their HR practices. The responses were later categorized and coded into four distinct categories including: effects on the applicant pool, loss of personal touch, cheating, and effects on targeted groups.

Organizational Image. We adapted a widely-researched measure of organizational image – the Organizational Culture Profile (OCP) (O'Reilly, Chatman and Caldwell, 1991) for use in this study. Specifically, we chose 15 of the 54 items from the OCP that corresponded with the seven factors measured by the OCP and added an additional item to capture an image factor relevant to our focus of interest (i.e., high technology).

Future Use. Two items assessed the managers' willingness to invest in technology-based HR practices in the future: 'I would recommend that other companies similar to ours would benefit from investing substantially in technologies for screening and selection' and 'Regarding technologies for screening and selection of job applicants in the near future, I would recommend that our company invest MORE resources', ranging from 'to a very limited extent' (1) to 'to a great extent' (7). A scale created from these items had acceptable reliability (alpha = .85).

Overall Success. A single item measured overall success: 'In general, how *successful* have been your organization's

efforts to acquire and implement technologies in the application, screening, and selection processes in your organization?' ranging from 'extremely unsuccessful' (1), to 'extremely successful' (7).

Results

Approximately 75% of the respondents completed the demographic characteristics. They represented a wide variety of organizations in many industries, including 'for profit services' industry (20.4%), other (18.3%), manufacturing durables (12.9%), and utilities (9.7%), with the remaining organizations spread over the other industries listed in the survey. The respondents worked in organizations that ranged in size from less than 100 to over 5000: the largest group came from organizations exceeding 5000 employees (23.7%), followed by 100–499 employees (21.6%), 500–999 (15.5%), <100 (15.5%), 1000–2499 (13.4%), and 2500–4999 (10.3%). The typical respondent described their position in Human Resources as: manager (43.3%), other (22.7%), director (12.4%), president (5.1%), vice president (4.1%), consultant (4.1%), supervisor (3.1%), administrator (3.1%), and assistant manager (2.1%). The respondents were a fairly well educated group with 63.3% possessing a bachelor's degree, 11.7% an MBA, 10.6% other master's, 10.6% some college work, and 1.1% a doctorate. The most frequent age group reported by the respondents was 30–39 (36.6%), followed by 40–49 (21.5%), 20–29 (21.5%), 50–59 (15.1%) and 60+ (5.4%). In addition, the majority of participants was female (71.6%).

Technologies used by Function and Organizational Level

Advertising Positions. The first point of contact for employers and applicants is typically the job advertisement (Barber, 1998; Rynes, 1991). We asked HR managers the extent to which they used various media to advertise their low-level, medium-level, and high-level positions. For low-level positions (such as clerical and manufacturing), organizations reported that they most frequently advertised using their own web sites (mean of 5.07 on a 7-point scale, where'7' indicated 'to a great extent') and employee referrals (mean of 5.01). They expected that advertising using web sites would increase and that newspapers would decrease in the future. For mid-level positions (such as professionals, technical employees, and management trainees), we see a similar pattern of results in terms of use of their own web sites (mean of 5.50) and employee referrals (mean of 4.68), and projected increases in the use of web sites and decreases in the use of newspapers. For high-level positions (such as executive and top management), organizations reported that they most frequently use their own Web sites (mean of 4.02), employee referrals (mean of 3.84), personal contacts (mean of 4.02), and search firms (mean of 4.37) – and expect that the use of web sites, employee referrals, personal contacts, and direct sourcing will increase in the future.

Receiving Applications. Respondents were asked to indicate the percentage of applications received in each category as well as their projections for how many they expected to receive in each of these categories five years from now. The results for low-level positions reveal that organizations most frequently receive applications through regular mail (26.92%) and email (25.25%) – but expect to receive most applications in the future through the Web and email. For both mid-level and high-level positions, organizations reported that they most frequently receive applications through email (33.77% and 28.69%, respectively) – and expect to receive most applications in the future through the Web and email.

Initial Screening for Positions. For low-level positions, organizations reported that they most frequently initially screen applicants through traditional manual screening of applicants' materials (mean of 5.91 on a 7-point scale) and through face-to-face screening interviews (mean of 5.22). In the future, they expect to see an increase in computer-based keyword searches of resumes, computer-based scoring of standardized applications, tests (such as cognitive ability tests), telephone IVR systems, and videoconferencing. For mid-level positions, organizations reported that they most frequently initially screen applicants through traditional manual screening of applicants' materials (mean of 5.85), telephone screening interviews (mean of 4.86), and face-to-face screening interviews (mean of 5.14). In the future, they expect to see an increase in computer-based keyword searches of resumes, computer-based scoring of standardized applications, tests (such as cognitive ability tests), telephone IVR (interactive voice response) systems, and videoconferencing. For high-level positions, organizations reported that they most frequently initially screen applicants through manual screening of applicants' materials (mean of 5.70), telephone screening interviews (mean of 4.81), and face-to-face screening interviews (mean of 5.39). In the future, they expect to see an increase in computer-based keyword searches of resumes, computer-based scoring of standardized applications, tests (such as cognitive ability tests), and videoconferencing.

Final Selection. Technology is used little today in final selection decisions. Most final selection decisions are made face-to-face (means of 94.06%, 92.12%, and 94.49% for low-level, mid-level, and high-level positions, respectively) – and organizations expect to continue to use face-to-face interviews to make most of these final decisions in the future. A small increase in the use of videoconferences for final selection decisions is expected across all levels of

hiring with approximately 10% of hiring anticipated to take place via videoconference.

Goals for Technology Use

Respondents provided the following reasons for implementing technology-based tools: Efficiency (44.8%), Enable New Assessment Tools (41.1%), Reduce Costs (31%), Standardize Systems (27.6%), Expand Applicant Pool (24.1%), Promote Organizational Image (15.5%), and Increase Applicant Convenience (15.5%). Although respondents saw many potential benefits to technology use, they felt that most of these goals were only somewhat met (usually between 4 and 5 on a 7-point scale). Interestingly, the least mentioned goal (increasing applicant convenience) was met most, while the goal of enabling new assessment technologies was met least. For example, many organizations reported significant problems with the assessment tools they had purchased, or technology glitches that rendered their departments inoperable. For example, one manager noted that '*We are depending on [technology] too much! When we experience difficulties with our systems, we are virtually paralyzed until they are fixed*'.

Unintended Effects of Technologies

Many organizations underestimate the challenge of adopting technology solutions in recruiting and selection. Managers mentioned the effects of expanding the applicant pool, issues around a loss of personal touch, concerns about cheating, and adverse impact worries.

Expanding Applicant Pool. When we asked survey respondents for any unintended benefits of technologies to their organizations, the most frequently-reported benefit related to expanding the applicant pool (reaching a wider range of applicants from a larger geographical area). Interestingly, this also was reported as the most frequent disadvantage, because the number of under-qualified and out-of-country applicants might increase. Putting up a web site can result in a flurry of applications that require attention or the risk of turning off applicants. One of the organizations we interviewed reported receiving 5,000 applications per week through their web site; another reported receiving 40,000 applications over a four-month period through their online application system. Without an efficient means of dealing with this torrent of applications, the HR manager is essentially panning for gold in a raging river and probably missing most of the nuggets. One senior HR executive warned: '*Don't underestimate the complexity in what you have to put into these kinds of projects to do them well. … Merely putting an application form online and having a piece of paper generated at the other end doesn't get you very far. In fact, it might even slow you down*'.

A Loss of Personal Touch. HR has traditionally prided itself on emphasizing the human element in organizations and some balk at the thought of using technologies that have the potential to de-humanize the selection process. For example, one survey respondent objected to '*the amount of time our Recruiters spend on the computer searching databases and recording activities. We have lost much of the face-to-face or at least phone contact they had with applicants in the past*'. However, in our interviews with managers, two compelling pro-technology arguments were related to us. The first argument is that the use of technology appears to be very successful in generating applicants (although not always the right ones) suggesting that applicants are comfortable enough to use the technology when it is provided. The second argument is that, while a larger number of applicants may result, ultimately, a more efficient screening system may permit more 'face time' with the best applicants as less desirable applicants are easily screened out.

What about Cheating? Organizations identified a hurdle to using online applications, particularly for using computer-based testing for cognitive ability, knowledge, etc. – that is, the problem of ensuring that the individual sitting at the computer is really the applicant and not a local rocket scientist hired to take the test for the applicant. Further, employers worried about placing proprietary tests online as they might be copied by competitors, or shared among applicants, thereby undermining the predictive validity of their tests. While this is less of a problem for biodata or personality tests, it poses a real threat to the use of abilities tests.

Avoiding Adverse Impact. Employers also worried that using technology-based tools could result in adverse impact, as access to technology is partly dependent on socio-economic status. We were assured that this did not appear to be having a detrimental effect on the number of minority applicants applying for jobs. In fact, one HR manager noted that they were able to hire more minority applicants as a result of adopting an online application procedure. By increasing the overall numbers of applicants, they had a higher number of minority applicants who met their cutoffs and therefore were able to fill more positions from targeted groups. This became an unforeseen benefit of using technology, rather than a liability.

How much do these technologies cost?

Costs to implement technologies can be substantial – and surveyed organizations were reluctant to share these costs with us. However, interviewed organizations mentioned cost categories such as security, user-acceptance testing, stress testing, maintenance, selection of vendors, the redesign of organizational processes, time of HR and Information Technology employees, and training and

change-management costs. Although costs vary considerably, each of the interviewed companies noted that they had to expend many person-hours to implement their systems. For example, one of the companies had invested heavily in technology ($3M) for its US operations, and they planned to expand their North American practices first to Europe and possibly to other regions. Other large companies reported spending substantially less money (under $100K) as a result of buying off-the-shelf software, and subscribing to commercial web sites. Another reported spending approximately $50K-75K (and up to $400K) per tool despite developing most of their tools in-house. One senior recruiter lamented that inexpensive technology has, in effect, leveled the recruiting playing field with small players having equal access to the same candidate resumes as the larger organizations: '*The problem with technology is that it always creates another problem. So there are more companies looking at the same candidate that you are looking at. The Internet has created extensive competition*'.

Ultimately, the costs will depend on the amount of hiring that companies engage in each year. Large companies hiring thousands of employees each year can benefit from careful and customized development of their own systems. Smaller companies and those who do less hiring may benefit more from buying commercial applications. Some of our HR executives cautioned that vendors should be chosen carefully. Problems integrating vendor systems with existing Human Resource Information Systems (HRIS) were reported by several of the companies.

Overall Success in Implementing Technologies

Organizations have met with mixed success in acquiring and implementing technologies in support of their application, screening, and selection processes. Most of the survey respondents rated their organizations as being moderately or partially successful with approximately 25% indicating strong success and nearly a third reporting limited success. Larger organizations reported having less success than smaller ones ($r = -.44$, $p < .001$). Similarly, most of the HR managers we interviewed were guardedly enthusiastic about their company's experiences with using new technologies in recruiting and selection. It is apparent that many applicants are ready to apply to companies using these technologies. However, several HR managers noted that the quality of applicants was not always better. When asked if applicants through the Web differ from those applying through more traditional means, organizations indicated that the average applicant may be of the same quality, but that the quantity of applications is greatly increased. The Internet makes applying for a position inexpensive and as easy as a few mouse clicks. The result can be large numbers of unqualified applicants, and increased numbers of international applicants (even when the organization's web site clearly states that positions are not open to foreign nationals). One of the organizations suggested that this is not a concern because these candidates can be automatically weeded out through searches (such as keyword searches) and because more well-qualified candidates also apply. However, if organizations do not use keyword searches, the increased number of applicants can be a concern, as it is possible to be flooded with unqualified applicants. Several of the HR managers we spoke with strongly recommended having a well-organized system and screening criteria in place to handle the volume prior to going on the Web. Failure to do so could result in unhappy applicants who hear nothing back from the organization.

Organizational Image and Future Investment in HR Technology

To test whether organizational image predicted future investment in HR technology we first subjected the 16 organizational image items to a principal components factor analysis with orthogonal rotation. This yielded two organizational image factors including: (a) People Orientation, 11 items, alpha = .97, (e.g., 'respect for people', 'people orientation', 'well-managed', 'an excellent employer') and (b) Dynamism, 5 items, alpha = .91 (e.g., 'Aggressive', 'Growth-oriented', 'Dynamic', 'Innovative.') Although two distinct factors were obtained, many of the items cross-loaded on the other factor and consequently the two factors were highly correlated ($r = .80$, $p < .001$).

We examined the relationship between organizational image and both future use and reported success with HR technologies. For future use, a hierarchical regression was conducted with two steps. The size of the organization (based on the number of employees) and the number of years that the organization had been using technology in HR were entered in the first block, $R^2 = .10$, $F(2,63) = 3.36$, $p < .05$, followed by the two organizational image scales in the second block which added significantly to the prediction of future use, $R^2 = .25$ F change $(4, 61) = 6.08$, $p < .01$. Specifically, we found that those organizations projecting an image of People Orientation were less likely to report that their organization should invest more in acquiring and implementing technologies ($\beta = -.68$, $p < .001$, while those projecting an image of Dynamism (growth-oriented, aggressive, dynamic, and results-oriented) were more likely to report that their organizations would invest more in the future ($\beta = .61$, $p < .01$). These results should be interpreted cautiously however due to the fact that the two image factors were highly correlated and may have produced suppression effects.

Surprisingly, prior overall success with using these technologies was not correlated with future use of the technologies ($r = .04$, ns). This weak result may be due to the fact that despite the mixed success reported by our survey respondents, they nevertheless remained optimistic

regarding the future use of technologies. Their average rating on an item measuring whether they would recommend future investment in HR technology was 5.51 (s.d. 1.43) on a 7-point scale. Further, none of the companies we interviewed felt that technology use in HR was a fleeting trend. Each company we spoke with had plans for increasing their reliance on technology-based approaches to recruiting and selection. They reported that they could reduce hiring cycles and costs, and bring scarce HR resources to bear on the best candidates by employing technology in the screening process.

Discussion and Conclusions

This snapshot of the current state of affairs with respect to technology use in recruiting and selection in North America reveals that while technology use is becoming more prevalent in organizations (particularly for mid-level staffing), most organizations rely on a mix of traditional methods and technology solutions in their daily activities. Organizations that reported projecting the image of being a dynamic culture that values an aggressive, growth-oriented approach reported being more likely to adopt emerging HR technologies while organizations that reported being more people-oriented have been more cautious.

HR managers have pinned many hopes on technology from increasing efficiency, and reducing costs to increasing applicant pools and standardizing their entire selection systems. While there are some success stories out there, the majority of organizations reported achieving moderate results with the use of technology-based solutions. As one HR manager put it, 'Software and techniques are short lived. Today's top product is tomorrow's burden.' Ironically, although many organizations reported that they had a goal of reaching a larger applicant pool with their technologies, their experiences showed that while the size of the applicant pool increased, the average quality of applicants did not change or was lowered, leaving them flooded with applicants from under-qualified or ineligible applicants (e.g., from non-nationals).

Each of the companies we interviewed reported that there were challenges associated with using technology-based practices in HR. An emphasis on careful planning prior to implementing the technologies was a common recommendation. While organizations may be tempted to go online or get left behind, failing to anticipate issues such as compatibility with existing systems and practices, training of staff, upgrading and maintenance costs, security, handling applicant volumes, unreliable vendors, applicant cheating, and possible negative applicant reactions could generate more problems than solutions.

Despite the decidedly mixed results, most HR managers surveyed believed that HR technologies were going to become more popular in the future and believed their organizations should invest more money in technology-based HR solutions. Perhaps increased investment will lead to more organizational learning about effective technologies and practices associated with these technologies. However, future studies should investigate why larger organizations report less success in adopting these technologies. Our results suggest that integration with large existing systems that are difficult and expensive to modify may be one contributing factor but there are doubtless others that need to be examined.

Limitations and Implications for Future Research

There are several limitations with the present study that should be addressed in future research. Although we provided some information on predictors of technology use in HR departments for recruiting and selection (notably organizational image), there clearly exist many opportunities to identify other antecedents to technology use in recruiting and selection. For example, organizational resources, industry and company norms for technology use, target population and other factors may all contribute to the use of technology for HR functions.

A second limitation relates to the representativeness of our sample. Although only corporate-level HR managers received the surveys (that is, no branch or regional managers from the same organization received surveys), there is the possibility that more than one employee from the same organization received the survey. Further, our response rate was somewhat lower than anticipated. It is possible that administrative assistants screened out our email before getting to these busy managers or that the recruiting email was deleted without reading it. Methods need to be developed to maximize participation in online surveys. Future research should attempt to obtain larger samples to replicate these findings and to examine the adoption of technology practices outside of North America.

A third limitation stems from the fact that we used self-report data, which may overestimate some of the relationships between predictors and outcomes due to common method variance. However, our interviews with managers and open-ended comments from survey respondents help to minimize this risk. Future research may try to obtain a mixture of other data sources, including archival data.

In conclusion, the use of technology in personnel selection and recruiting is evolving rapidly. Our survey of companies and in-depth interviews suggest that much of the activity is focused on generating and screening applicants in middle-level positions and for high-tech workers, while lower-level positions and senior management positions continue to be recruited and selected through more traditional approaches. Technology has yet to play much of a role in the final selection process as most interviewers report preferring a high-touch approach in the later stages of selection.

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