

IS Staffing During a Recession: Comparing Student and IS Recruiter Perceptions

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ABSTRACT

The current economic situation in the United States has associated ramifications for IS employment. This study identifies IS recruiters' perceptions vis-à-vis IT budget cuts and layoffs at their organizations. Additionally, it identifies IS student perceptions vis-à-vis employment opportunities and academic preparation. Similar surveys were completed by 232 IS recruiters and 182 IS students. Consistent with prior research, findings indicate that IS budgets are expected to decrease less than overall organizational budgets. Although IS students were optimistic about internship and employment opportunities; IS recruiters expressed more caution, suggesting no changes or decreases in employment opportunities. IS recruiters and students provided suggestions for curricular redesign due to the recession. The results of this study are discussed in terms of advising students and improving IS programs.

Keywords: Recession, IS Staffing, IS Internships, IS Employment, IS Budgets

1. INTRODUCTION

The negative impacts of the global recession are a central theme of news media reports. The unemployment rate increased from 7.6% to 9.5% between January and June 2009 (Statistics, 2009b). During times of economic downturns, organizations scrutinize all possible areas for cutbacks. Forty-three percent of Chief Information Officers (CIOs) surveyed in late 2008 anticipated decreasing their operating expenses; 26 percent anticipated cutting back on proposed new investments (Thibodeau, 2008).

Although the information technology (IT) budget does constitute a significant portion of an organization's overall budget and is frequently perceived as a cost line item rather than a revenue line item, an organization's IT budget level has been empirically proven to stimulate and predict future profitability (Kobelsky *et al.*, 2008). Organizations which cut information systems (IS) personnel therefore risk losing strategic advantages associated with leveraging technology to recover from the recession in ways that also position the organization to benefit from an economic recovery (Chapman, 2009). Paradoxically then, at a time when investment in IT and IS personnel are recognized as a means

for recovering from a recession, some organizations consider reducing their IT budget, which includes both the technologies as well as IS personnel.

The pervasiveness of cutbacks and unemployment related to the recession increases the likelihood that IS faculty, students and recruiters are aware of possible reductions in IS-related employment opportunities, with possible consequences for IS enrollment. IS programs are just now recovering from the mass IT layoffs and correlated decline in enrollments resulting from the 2001 dot-com bust. The purpose of this research is to ascertain industry and student perceptions regarding the impact of the recession on IS staffing in industry and on IS curricula at universities. The results of this research will be valuable to IS faculty interested in revising their curricula to meet current industry needs as well as advising students on how to best prepare themselves for a more competitive workforce.

This paper is organized as follows. The literature review describes the current state of the economic recession and discusses why maintaining or increasing IS budgets and staffing is a strategic decision, especially during a recession. IS enrollment trends are then reviewed in light of another recent economic downturn—the dot-com bust. The research methodology section defines the research questions guiding the current study and then describes both the survey instruments and the statistical analysis methodology. The results section begins with a descriptive analysis and then presents the data, organized by research question. The paper closes with a discussion of the findings and main conclusions.

2. LITERATURE REVIEW

1.1. Current State of Recession

The overall United States (US) unemployment rate is 9.5 percent (Statistics, 2009b). The Federal Reserve predicted an unemployment rate of 10% or above by the end of 2009 (Irwin, 2009) with unemployment recovery taking nearly five years. The US Gross Domestic Product (GDP) decreased at an annual rate of 5.5 percent for the first quarter of 2009 (Mataloni and Key, 2009). The stock market nearly collapsed under a 48 percent plunge during 2008, resulting in an estimated global loss of \$25 trillion; the stock market is expected to incur an additional 4 percent overall decline in 2009 (Tanzer, 2009). The US is in a recession. Impacts of the recession on established IS professionals might include decimated benefits or unemployment. An impact of the recession on new IS graduates might be job unavailability. “Job Cuts” dominate media reports both nationally and internationally across all industry sectors. The Conference Board (<http://www.conference-board.org/>) predicted a loss of 2 million more jobs in 2009, adding to the 2.6 million jobs lost in 2008 (Padden, 2009).

However, the recession could actually increase national IS employment opportunities. The global recession and associated increase in unemployment resulted in increased costs for internationally outsourced projects and decreased costs for outsourcing nationally (Lundquist, 2008). In many instances IS personnel who were work-force reduced reinvented themselves as national outsource providers with distinct competitive advantages associated with knowledge

of their former employer’s business processes, existing relationship networks, and compliance with national copyright/security legislation. Additionally, President Obama is supportive of increasing IT jobs while simultaneously reducing work visas and reducing tax breaks to companies that outsource internationally (Thibodeau, 2008, Thibodeau, 2009).

Data collected by the United States Bureau of Labor Statistics (BLS) indicates that while IS/IT jobs might not be recession proof, the quantity of jobs is projected to increase by 29 percent in the next decade (Statistics, 2009a). An increase of 29 percent translates to 146,000 new jobs, which stands in stark contrast to the projected 10 percent overall increase for all jobs (Wright, 2009) and decrease in some basic computer-related jobs such as computer programming that are offshored. The projected increase in IS employment is associated with a corresponding increase in the number of organizations using complex information technologies to manipulate data distributed via Internet, intranet and wireless media (Statistics, 2009a).

1.2. Association Between IS Investments and Firm Performance

Justification for maintaining or increasing IS staff is supported by research investigating the association between IS/IT investments and firm performance. Reviews of this body of literature (Francalanci and Morabito, 2008, Mittal and Nault, 2009, Oh and Pinsonneault, 2007) highlight a variety of theories and models used to assess direct or indirect associations between IS investments and firm performance. Regardless of the research approach or industry sector, two main findings recur: (1) investments in IT and related IS personnel must be aligned with firm-level strategies in order for firms to realize benefits; (2) the availability and strategic deployment of IS-skilled workers is a prerequisite for return on investment (ROI).

IT can be used to promote revenue growth or improve business processes. The degree of IT investments varies based on a firm’s growth expectations (Mittra, 2005): firms with high-growth expectations increase their IT spending as their free cash flow increases; low-growth firms maintain a constant level of IT spending, irrespective of their free cash flow. A superior IT infrastructure significantly reduces the cost of operations for high-growth firms in subsequent periods (Mittra, 2005). IT alignment with a cost reduction strategy generates more immediate and tangible benefits for firms than IT-strategy alignment that aims to facilitate revenue growth (Oh and Pinsonneault, 2007).

While most organizations could benefit from using IT to increase cost-effectiveness (Mittra, 2005, Oh and Pinsonneault, 2007), IT investments provide competitive business advantage if those strategies are aligned with overall firm strategy rather than just departmental or IS goals and strategies (Fairbank *et al.*, 2006, Krell and Matook, 2009, Peslak, 2008). The more integrated technology is throughout the organization, the better an organization is able to absorb knowledge from external sources and convert that knowledge to a competitive advantage (Francalanci and Morabito, 2008). Fortune 1000 firms that increased IT investments in preparation for the Y2K situation were in a better position to exploit those technologies to redefine their

business processes and relationships (Anderson *et al.*, 2006). The result for those firms was increased value and firm performance.

Studies focused on developing economic models to measure the impact of IT investments on firm performance (Chun and Mun, 2006, Hempell, 2005, Lee, 2008, Mittal and Nault, 2009) indicated that labor was a critical factor in increasing firm performance/profitability through IT investments. Decreasing costs in IT have resulted in a higher substitution of IT for production factors such as labor and non-IT equipment—mostly in manufacturing and less IT-intensive industry sectors than in service or higher IT-intensive industries (Chun and Mun, 2006). Therefore, IT investments are an important source of labor productivity growth in the US economy both in the IT-using and the related IT-producing industries (Chun and Mun, 2006). In the German service sector (Hempell, 2005), a one-percent increase in IT increased resulted in an ROI of more than 50 percent, if the firm utilized workers skilled in using the technologies. Isolated IT investments in several hundred Taiwanese firms (Lee, 2008) had a negative impact on firm profitability. However, when IT investments were coupled with related investments in labor and training, then one IT-related labor investment could lead to an increase of more than one ROI unit. Both direct and indirect effects of IT are significant. The indirect effects of IT predominate in the IT-intensive sector; the direct effects of IT predominate in the non-IT intensive sector (Mittal and Nault, 2009). The implication for decision-makers is that for IT-intensive industries, the gains from IT come primarily through indirect effects such as the augmentation of non-IT capital and labor.

Other studies further emphasize the important role of IS personnel. Increases in the quantity of IT-skilled workers was statistically associated with increases in firm-level output; that is, firms realized an increased ROI in IT-skilled labor (Kudyba, 2004). In fact, firms that invested in IT without a corresponding increase in IT-skilled labor realized net losses (Kudyba, 2004). Very valuable employees are the managers who understand IT capabilities and know how to leverage those capabilities with non-IT resources in order to attain competitive advantage (Jeffers *et al.*, 2008). Organizations knowledgeable of IT strategic advantages would be wise to maintain or increase IS staffing, even during a recession.

1.3. Enrollment Trends in IS

In order to supply industry demands for skilled IS workers, IS programs must maintain or increase enrollment throughout the recession. The dot-com boost and subsequent bust between 2000-2002 was followed by media reports that IT jobs were in the decline and remaining IT jobs were being outsourced internationally. A corresponding consequence of the dot-com bust was decreased enrollments in IS and computer science programs. Conference presentations and journal articles cited enrollment decreases between 42 and 75 percent (Gaber, 2008, Granger *et al.*, 2007, Huang *et al.*, 2006, Huang *et al.*, 2008, Wong *et al.*, 2007). Research (Huang *et al.*, 2008) indicated that IS students believed they would not find jobs because the IS jobs had been outsourced internationally. The source of their information concerning lack of IS jobs came from parents, news media, and friends.

The media influenced families, who then influenced entering students (Zhang, 2007). Now the news media daily emphasize unemployment rates associated with the recession. Rather than wait to see if media reports will be associated with a corresponding decrease in enrollment in IS programs, IS faculty need to identify and address student perceptions regarding the impact the recession might have on IS employment opportunities.

The decline in enrollment associated with the dot-com bust forced IS faculty to assess the changing needs of both students and industry. First the literature identifying factors impacting students' decisions to major in IS will be examined, followed by the current skills required of IS graduates and then finally the different approaches IS departments have taken to revise their curricula to meet both student and industry needs.

IS researchers explored a variety of reasons students did or did not enroll in IS programs and then designed marketing/educational approaches to promote the positive while simultaneously countering the negative.

Salary continues to be a major factor contributing to increased enrollment in IS programs (Brandel, 2008, Crampton *et al.*, 2006, Lee and Lee, 2006, Walstrom *et al.*, 2008). Employees with a bachelor's degree in IS earned an average of \$74,768 in 2008; employees with a master's in IS earned an average of \$82,101 (Brandel, 2008).

Job availability also continues to be an important criterion when selecting a major (Crampton *et al.*, 2006, Lee and Lee, 2006, Walstrom *et al.*, 2008, Zhang, 2007). Some students associate IS with "hard to find jobs" and turn instead to other business majors, despite the fact that industry need far surpasses the supply of IS graduates academia can produce. The demand for qualified IS graduates is fueled by industry growth, onshoring (Lundquist, 2008), and recognition of IT as a means to achieving competitive advantage (Thibodeau, 2009).

The disconnect between student perception and industry reality may be the most important factor associated with enrollment decreases. Students enrolled in an introductory business course indicated a lack of awareness of IS as a college major, lack of awareness regarding IS career opportunities, and lack of understanding regarding typical tasks related to IS positions (Walstrom *et al.*, 2008). Students in an entry level business class responded that they were more knowledgeable about careers in management, marketing, accounting, and finance than they were about careers in information systems or other computer-related fields (Lomerson and Pollacia, 2006, Walstrom *et al.*, 2008). However, once students' awareness level regarding IS was raised, then personal interest in IS became the predominant factor influencing their choice to major in IS (Akbulut *et al.*, 2008, Lee and Lee, 2006, Walstrom *et al.*, 2008, Zhang, 2007).

Difficulty of curriculum negatively influenced students who otherwise indicated possible interest in the IS program (Lee and Lee, 2006, Zhang, 2007). The perception that an IS curriculum is too hard or too difficult might be associated with an outdated perception of an IS career consisting of programming COBOL applications. Recent research identified skills required of entry-level IS employees in order to meet industry needs, revise curricula to meet those needs

and educate students to the new, perhaps less difficult, curricula.

Personal and interpersonal skills (such as communication and teamwork) were the most frequently or highly rated skills required of entry-level systems analysts/programmers, followed closely by a solid foundation in both business and technical skills (Aasheim *et al.*, 2009, Downey *et al.*, 2008, Kim *et al.*, 2006, Lee and Han, 2008, Plice and Reinig, 2009, Wright, 2009). Project management, systems analysis and design and cost-benefit analysis were valued business skills ((Kim *et al.*, 2006, Plice and Reinig, 2009, Wright, 2009). In contrast to graduates from some other computer-related fields focused mostly on technology, IS graduates need to be well rounded in terms of having business acumen, know which technological approach would be most appropriate to apply in a given situation and be able to communicate their decisions concisely and effectively. Communication and business acumen are not, however, a substitute for the required technical skills that IS graduates must possess. Database, computer languages, web design, programming, general knowledge of development, implementation, operation/maintenance, systems analysis and design, wireless networking, and information security were all technical skills that employers indicated were required of entry-level analysts/programmers (Downey *et al.*, 2008, Lee and Han, 2008, Wright, 2009).

IS faculty from around the world pulled together to share ideas about how to revise the IS curricula to meet the changing needs of industry and increase enrollments. Perhaps the most widely recognized collaborative effort was in response to the 2007 request posted on *ISWorld* (Granger *et al.*, 2007). Suggestions submitted by different IS departments included aligning the IS curricula better with industry-defined skills/needs, creating “secondary programs (minors, certificates, partnerships), increasing marketing and promotional activities to reach target audiences and increasing awareness of IS programs both within the university and society at large. An overarching goal was to make IS more visible and appealing to current students enrolled in the “Intro to IS” course and to prospective students and their influencers via increased visibility and an updated awareness of what IS really is.

Curriculum changes to the introductory IS course typical of most IS programs have been effective in increasing enrollment in the IS program (Akbulut *et al.*, 2008). Ohio University realized a 75% increase in enrollment after implementing a planned curricular redesign with a central strategic focus and integrated courses, with prerequisite courses providing the skills required by subsequent courses, and an integrated introductory IS course that serves as a recruitment tool (McGann *et al.*, 2007). The University of Wisconsin at Eau Claire also realized a significant increase in enrollment after creating a double emphasis (business analyst and systems development), aligning course content with industry needs, and redesigning/revitalizing their introductory IS course (Gaber, 2008). The University of Alaska at Anchorage redesigned their curriculum by creating client projects that spanned three semesters of core IS classes (Drinka and Yen, 2008). Although most IS departments engage in continual improvement, the major curricular

redesigns identified here were in response to sharply decreased enrollments associated with the dot-com bust. Major curricular redesigns require significant time and effort from IS faculty. This study aims to proactively identify any recession-related changes in IS staffing that might be counterbalanced by curricular or advising changes.

3. RESEARCH METHODOLOGY

3.1 Research Questions

Three main research questions guided this study:

1. Will organizations knowledgeable of the strategic advantage provided by IS protect their IS budgets, maintain (or decrease less) their IS staffing, and continue to recruit/hire new IS interns/graduates?
2. Are student perceptions about the impact of the recession on IS staffing comparable to IS recruiters’ perceptions?
3. What curricular or advising changes, if any, should IS faculty make to better prepare students for the workforce?

3.2 Instrument Development

Two similar survey instruments were developed and pilot tested Spring 2009. The first survey (developed collaboratively by both faculty and industry personnel) focused on industry perception of planned organization-wide budgeting, IS budgeting and IS recruiting. Additional questions solicited industry perception regarding possible curricular changes and advisory-council discussion topics regarding IS trends during the recession. Although the survey was anonymous, respondents could provide identifying information. Due to space constraints, the industry survey questions (rather than the full survey) are located in Appendix A. A 6-point Likert-scale was used for most questions, with binary (yes/no) and open-ended questions also used. The first two points on the Likert scale reflected negative values (e.g., decrease, layoffs, none). The third point was neutral, which was very relevant to this research (e.g., No change in the case of budgets, layoffs, hires or a midpoint value representing number of graduates/interns an organization anticipated hiring). The two points to the right of neutral represented more positive indicators (e.g., increase, hires, and a larger number of graduates/interns). The right anchor “Unsure” was added as a result of the initial pilot study to ensure more accurate responses. Large percentage categories (e.g., 50% or more; 10-49%) were used based on feedback from the pilot study indicating that budgets and related decisions would be monitored and modified as the recession continued, so more precise response categories would confound the results.

The industry survey was pilot tested using industry advisory committee members from one university before being modified slightly and administered to approximately 4,800 IS recruiters from 3 participating universities in the United States. Use of IS recruiter perceptions as a proxy of an organization’s actual staffing and budget changes is supported by research (Tallon and Kraemer, 2007). Executives’ perceptions were close to factual status regarding IT impact on firm performance (Tallon and Kraemer, 2007). This study drew upon IS recruiters’

perceptions of both organizational and IS departmental status regarding budgets and staffing—knowledge they possessed.

Each industry survey was customized with representative university and department names and addressed to individual IS recruiters affiliated with each university. The online survey was created in *Zoomerang*, with a separate url for each university. Both an initial and a two-week-reminder invitation to participate in the survey were emailed to all IS recruiters registered with each university’s career services office. The emailed invitations pulled recipients’ full names and email addresses from the recruiter databases.

The purpose of the second survey was to determine how closely students’ perceptions matched industry personnel’s perceptions regarding IS staffing and recruiting during this recession. Therefore, the student version of the survey included most of the same IS staffing and recruiting questions. The student survey also included questions addressing students’ perceptions of their majors and minors in light of the recession.

The student survey was administered via hard copy to students in core IS classes (e.g., database management, systems analysis and design, capstone senior seminar) at the end of the Spring 2009 or the beginning of the Summer 2009 term. In-class administration of hard-copy surveys were used to increase the response rate.

3.3 Description of Statistical Analysis

The Kolmogorov-Smirnov (K-S) test for two independent samples was used to compare the two distributions. The K-S test is a nonparametric test used to determine whether two distributions are statistically different. That is, the K-S tests to see if the distribution of data in the population from which Sample 1 was derived is different from the distribution of data in the population from which Sample 2 was derived. This was an appropriate test for this research study since comparing the two cumulative frequency distributions was the focus. Collapsing the distributions to mean scores (typical of t-test analyses) would have returned non-meaningful data. Additionally, the K-S test of goodness-of-fit is more powerful than the chi-square goodness-of-fit test when the categories can be ordered along an underlying continuum and no parameters must be estimated from the data (Glass and Hopkins, 1984). The survey instruments used in this data contained ordinal data (the distances between the values were arbitrary). Questions not answered or answered with “unsure” were omitted from the statistical analyses. The K-S test returns a Z-score and level of significance, both of which are reported here.

Multiple t-tests were used to test all questions for regional differences in responses to individual questions. The only question that showed a regional difference was Question 10 of the industry survey. The difference is discussed in Section 4.3.4.

4. RESULTS

4.1 Descriptive Analysis

A total of 232 respondents from a wide variety of industries (see Table 1) completed the industry survey. A list of the

write-in industry classifications indicated by “Other” is included in Appendix B.

Industry	Number of Respondents	Percent
Other	53	22.75
Retail Service	36	15.45
Public Sector		
Government	36	15.45
Nonprofit	30	12.88
Professional		
Service	28	12.02
Private Sector		
Public Sector		
Education	8	3.86
Agricultural	8	3.43
Utility	3	1.29
Transportation	2	0.86
Not Answered	2	0.86
Manufacturing	1	0.43
Total	232	100

Table 1. Respondents by Industry (in order of frequency)

A total of 182 students from three geographically dispersed U.S. universities responded to the survey. Of those, 144 (79.12%) had IS/MIS as their current area of study, the remaining 20.88% had other areas, mainly business, as their major and an IS/MIS minor. Student academic standing and ethnicity are shown in Tables 2 and 3. The majority of students surveyed were seniors (58.24%) and Caucasian (80.77%); 133 (73.08%) students were male and 49 (26.92%) female. Since many IS programs require prior admittance to the College of Business, freshman students were not expected to be represented.

Standing	Number	Percent
Freshman	0	0.00
Sophomore	11	6.04
Junior	65	35.71
Senior	106	58.24

Table 2. Student Academic Standing

Ethnicity	Number	Percent
African American	4	2.20
Asian	16	8.79
Caucasian	147	80.77
Hispanic	4	2.20
Other	11	6.04

Table 3. Student Ethnicity

4.2 Research Question 1: Protecting the IS Budget (Including IS Staffing)

Results for the first research question were derived by comparing IS recruiter responses to the same type of questions focused first at the organizational level and then at the IS level within an organization.

4.2.1. Organizational versus IS Spending

Questions 2 and 5 of the industry survey compared changes in organization-wide versus IS budgets from 2008 to 2009. Table 4 and Figure 1 illustrate the number of respondents (#) and percentages (%) for each category.

Change	Organization-wide		IS	
	#	%	#	%
50% or larger decrease	12	5.85	6	3.16
10% to 49% decrease	113	55.12	57	30.00
No change	46	22.44	93	48.95
10% to 49% increase	33	16.10	32	16.84
50% or larger increase	1	0.49	2	1.05
	205	100	190	100

Table 4. Spending Comparison 2009 to 2008

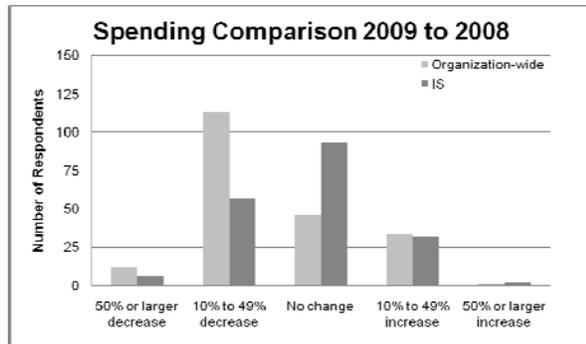


Figure 1. Spending Comparison 2009 to 2008

Figure 1 shows that the majority (55.12%) of organizations surveyed are planning a 10% to 49% decrease in their company spending whereas nearly half (48.12%) expect no change in their IS budget. At the point of maximum deviation separating the two cumulative probability distributions, the cumulative probability for decreases in organization-wide spending is significantly larger than the cumulative probability for IS spending. The Kolmogorov-Smirnov Z-value was 2.762 with a P-value < 0.0001 confirming a statistically significant difference between the two distributions.

4.2.2 Expected Hires/Layoffs

Questions 3 and 6 of the industry survey compared changes in organization-wide versus IS layoffs and hiring. Table 5 and Figure 2 illustrate the number of respondents and percentages for each category.

	Expected Hires/Layoffs			
	Organization-wide		IS	
	#	%	#	%
50% or more layoffs	2	0.99	4	2.11
10% to 49% layoffs	50	24.63	20	10.53
No change	105	51.72	138	72.63
10% to 49% hires	46	22.66	28	14.74
50% or more hires	0	0.00	0	0.00
	203	100	190	100

Table 5. Expected Hires/Layoffs

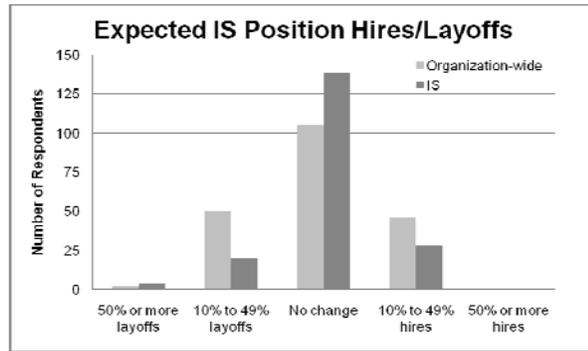


Figure 2. Expected Organization and IS Hires/Layoffs

Figure 2 shows that the majority of organizations (72.63%) expect no change in the IS staffing but only 51.72% expect no change at the organizational level. Surprisingly, organizations expected more of an increase in positions organization wide (22.66%) than in IS (14.74%). A comparison of the two distributions using the two-sample Kolmogorov-Smirnov test showed no statistically significant difference between the two distributions.

4.2.3 Hiring of Contractors

Questions 3 and 6 of the industry survey compared changes in organization-wide versus IS staffing using contractors from 2008 to 2009. Table 6 and Figure 3 illustrate the number of respondents and percentages for each category.

	Hiring of Contractors			
	Organization-wide		IS	
	#	%	#	%
50% or more decrease	12	6.28	9	4.79
10% to 49% decrease	28	14.66	17	9.04
No change	133	69.63	148	78.72
10% to 49% increase	17	8.90	13	6.91
50% or more increase	1	0.52	1	0.53
	191	100	188	100

Table 6. Hiring of Contractors

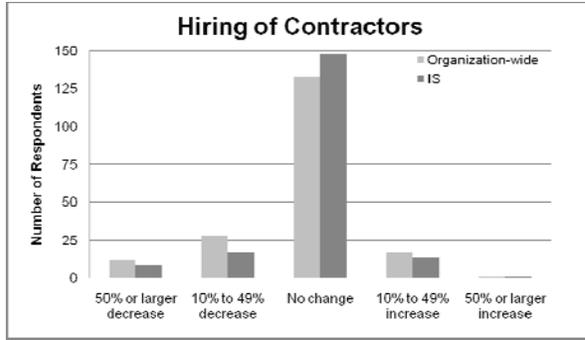


Figure 3. Hiring of Contractors

Figure 3 shows that the majority of organizations expect no change in hiring of contractors in the IS area (78.72%) or organization wide (69.63). A comparison of the two distributions using the two-sample Kolmogorov-Smirnov test showed no statistically significant difference between the two distributions.

4.3 Research Question 2: Student vs. Recruiter Perceptions Regarding IS Staffing

Results for the second research question were derived by comparing student and IS recruiter responses to questions focused both at the organizational level and the IS level within the organization.

4.3.1 Student versus IS Recruiter Perception of IS Budgets

Question 5 of the industry survey and Question 1 of the student survey compared student/recruiter perceptions regarding changes in IS budgets from 2008 to 2009. Table 7 and Figure 4 illustrate the number of respondents and percentages for each category.

	Student Perception		Industry Perception	
	#	%	#	%
50% or larger decrease	2	1.18	6	3.16
10% to 49% decrease	53	31.36	57	30.00
No change	18	10.65	93	48.95
10% to 49% increase	86	50.89	32	16.84
50% or larger increase	10	5.92	2	1.05
	169	100	190	100

Table 7. Student/Industry Perception of Spending Comparison

The Kolmogorov-Smirnov revealed a statistically significant difference between the two distributions. The student perception of IS spending differs significantly from the industry perception: students generally perceive that organizational IS budgets will either not change or increase, whereas recruiters anticipate a decrease in IS budgets. The Z-value was 3.680 with a P-value < 0.0001.

4.3.2 Student versus IS Recruiter Perception of Layoffs and Hiring. Question 6 of the industry survey and Question 2 of the student survey compared student/recruiter perceptions regarding changes in IS layoffs and hiring. Table 8 and Figure 5 illustrate the number of respondents and percentages for each category.

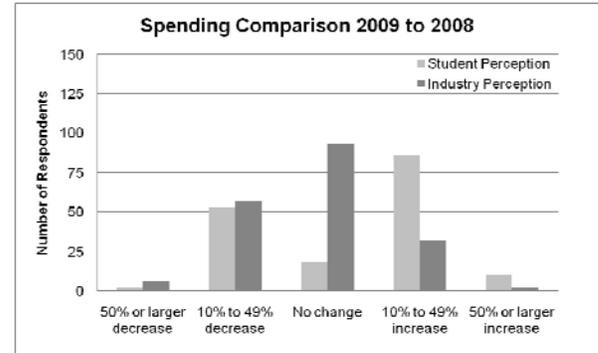


Figure 4. Student/Industry Perception of Spending Comparison

	Student Perception		Organization Perception	
	#	%	#	%
50% or more layoffs	0	0.00	4	2.11
10% to 49% layoffs	47	27.81	20	10.53
No change	46	27.22	138	72.63
10% to 49% more hires	73	43.20	28	14.74
50% or more hires	3	1.78	0	0.00
	169	100	190	100

Table 8. Student/Industry Perception for IS Position Hires/Layoffs

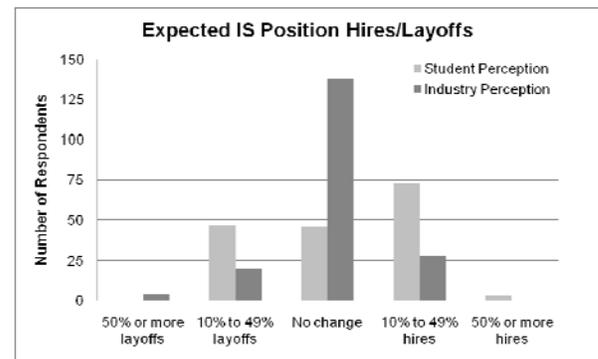


Figure 5. Student/Industry Perception for IS Position Hires/Layoffs

The Kolmogorov-Smirnov revealed a statistically significant difference between the two distributions. The student perception of the IS layoffs and hiring differs significantly from the industry perception: whereas the

number of student responses indicating perceived layoffs or no change were fairly equivalent and slightly more student responses indicated a perceived increase in IS hires, the vast majority of responses from IS recruiters indicated no change in layoffs or hires. Additionally, the tails of the two distributions were different: some students anticipated a 50% or more increase in hires, whereas some IS recruiters anticipated a 50% or more increase in layoffs. The Z-value was 2.589 with a P-value < 0.0001.

4.3.3 Student versus IS Recruiter Perception of Contractor Employment. Question 7 of the industry survey and Question 3 of the student survey compared student/recruiter perceptions regarding changes in use of IS contractors for staffing needs. Table 9 and Figure 6 illustrate the number of respondents and percentages for each category.

	Student Perception		Business Perception	
	#	%	#	%
50% or more decrease	0	0.00	9	4.79
10% to 49% decrease	46	29.11	17	9.04
No change	39	24.68	148	78.72
10% to 49% increase	67	42.41	13	6.91
50% or more increase	6	3.80	1	0.53
	158	100	188	100

Table 9. Student/Industry Perception of Hiring of Contractors

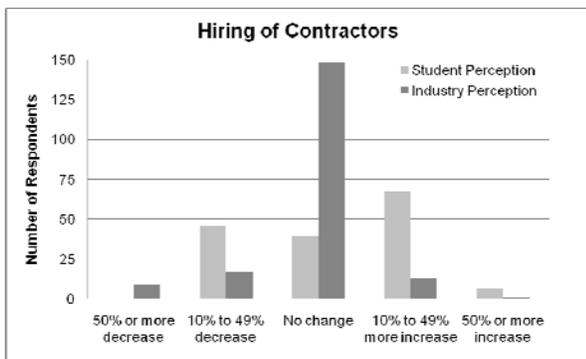


Figure 6. Student/Industry Perception of Hiring of Contractors

The Kolmogorov-Smirnov revealed a statistically significant difference between the two distributions. The student perception of the IS hiring of contractors differs significantly from the industry perception: whereas the number of student responses indicating perceived decreases in contractor staffing or no change were fairly equivalent and slightly more student responses indicated a perceived increase in IS contractor hires, the majority of responses from IS recruiters indicated no change in contractor employment. Additionally the tails of the two distributions were different: some students anticipated a 50% or more increase in contractor hires, whereas some IS recruiters

anticipated a 50% or more decrease in contractor hires. The Z-value was 3.591 with a P-value < 0.0001.

4.3.4 Student versus IS Recruiter Perception of IS Position Availability. Question 10 of the industry survey and Question 4 of the student survey compared student/recruiter perceptions regarding changes in the quantity of new IS graduates that organizations anticipated employing. Table 10 and Figure 7 illustrate the number of respondents and percentages for each category.

	Student Perception		Industry Perception	
	#	%	#	%
None	1	0.60	111	63.07
1 to 5	129	77.25	50	28.41
6 to 10	28	16.77	6	3.41
11 to 15	4	2.40	2	1.14
16 or more	5	2.99	7	3.98
	167	100	176	100

Table 10. Student/Industry Perception of Number of IS Positions Available

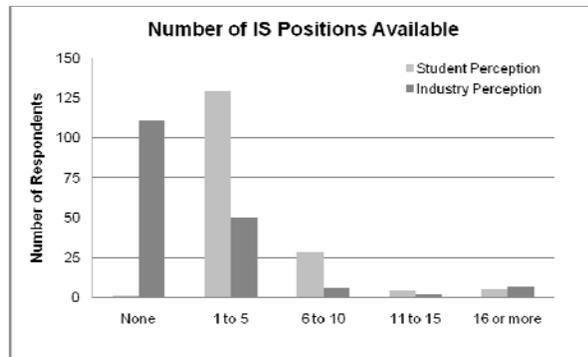


Figure 7: Student/Industry Perception of Number of IS Positions Available

The Kolmogorov-Smirnov revealed a statistically significant difference between the two distributions. The student perception of the number of IS positions available differs significantly from the industry perception. The most significant difference in the distribution is that IS recruiters overwhelmingly indicated zero to 5 new IS positions available whereas the students perceived at least 1 to 5 or more positions available. The Z-value was 5.783 with a P-value < 0.0001.

A t-test for regional differences in IS recruiter responses to Question 10 indicated that West coast university recruiters anticipated hiring less employees and interns than IS recruiters representing the other two universities. The corresponding question on the student survey indicated no region-based difference: the students were similarly optimistic regarding availability of IS positions.

4.3.5 Student versus IS Recruiter Perception of IS Internship Availability. Question 11 of the industry survey and Question 5 of the student survey compared

student/recruiter perceptions regarding changes in the quantity of IS interns that organizations anticipated employing. Table 11 and Figure 8 illustrate the number of respondents and percentages for each category.

	Student Perception		Industry Perception	
	#	%	#	%
None	4	2.34	132	67.35
1 to 5	115	67.25	46	23.47
6 to 10	43	25.15	10	5.10
11 to 15	7	4.09	2	1.02
16 or more	2	1.17	6	3.06
	171	100	196	100

Table 11. Student/Industry Perception of Number of IS Internships Available

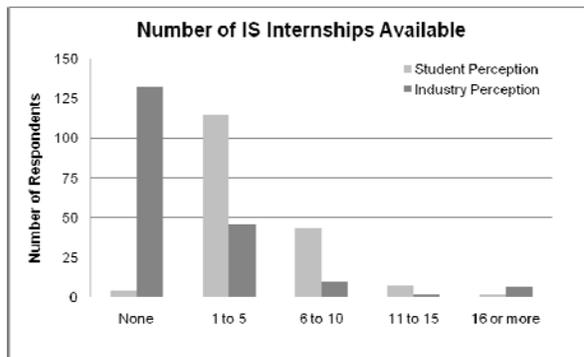


Figure 8: Student/Industry Perception of Number of IS Internships Available

The Kolmogorov-Smirnov revealed a statistically significant difference between the two distributions. The student perception of the number of IS positions available differs significantly from the industry perception. Similar to the difference regarding IS positions, the most significant difference in the internship distribution is that IS recruiters overwhelmingly indicated zero to 5 new IS internships available whereas the students perceived at least 1 to 5 or more internship positions available. The Z-value was 6.212 with a P-value < 0.0001.

4.4 Research Question 3: Curricular/Advising Changes

Results for the third research question were derived through a series of binary (yes/no) and open-ended questions regarding the current curriculum, trends in industry and student plans to add/change a major or minor.

4.4.1 Student Plans to Add/Change a Major or Minor

Twenty-six (14.29%) of the students had recently changed or were considering changing their major, but only 5 reported that the recession was an influential factor in the major change. Of the students who changed a major, 73% added or changed to IS, mostly from Computer Science. Only 1 student was changing an IS degree to another degree (Communications).

Twenty (10.99%) of the students had recently changed or were considering changing their minor, but only 5 reported that the recession was an influential factor in the minor change. Of the 20 students who had recently changed their minor, 11 changed their minor to IS.

Over a quarter of the students (48 or 26.37%) reported they recently added a major or minor to their program of study; 18 of those added IS. Nearly half of the students who added a major (23) indicated that the recession was an influential factor in their decision.

4.4.2 Students' Suggestions for Curricula Changes

Thirty-six (19.78%) students thought that the IS curriculum at their institution should be changed because of the recession. Their suggestions are categorized as indicated in Table 12.

Category of Response	Suggestions	
	#	%
Increased technical skills	10	29.41
Increased professionalism and business skills	6	17.65
Increased job searching skills	5	14.71
More competitive curriculum	4	11.76
Knowledge IS cost effectiveness	3	8.82
Increased hands-on learning	2	5.88
How to adjust	2	5.88
Broader employer profile	2	5.88
	34	100

Table 12. Student Suggestions for Curricula Changes due to Recession

Nearly one third of the student suggestions involved increasing the technical skills of the IS program. Specific student comments included suggestions such as “More programming since that’s what IS students usually start at,” “More technical and complex issues. Actual programming out of VB,” and “I feel like I’m not taking enough actual computer classes.”

Second to technical skills were the suggestions for a broader, business-focused education. Nearly 20% indicated a need for a higher level of expected professional and a broader base of business skills. Specific student comments included suggestions such as “A broader base of skills with a greater expectation for professional output,” “More linked to marketing/management,” and “Better width in skill sets to counter job difficulty in attainment.”

Interestingly, 15% of the student suggestions indicated a desire for job-searching skills taught at the curricular level. Specific student comments included suggestions such as “A way to job search in a recession,” “Make a class that is entirely dedicated towards helping students get a job/or internship,” and “Help us be differentiated from the competition (aka other graduates).” Related to the job-searching comments were two comments about adjusting: “We need to be better prepared. We need to adjust,” and “How to adjust.”

Also of interest were the suggestions for using IS to improve an organization's cost effectiveness: "More emphasis on cost-effective ways of IS implementation," "More focus on how IS can help reduce costs for business," and "More focus on money saving."

The category of comments labeled "More competitive curriculum" included general suggestions such as "Making our degree more competitive," "More IS classes offered more often," and "Better education than other school curriculum."

Two other suggestions were to provide "Less focus on corporate settings, more on small businesses and startups" and "More things relating to "green" technologies/methodologies. This is huge now."

4.4.3 IS Recruiters' Suggestions for Curricular Changes

Thirty-seven (16.44%) participants of the industry survey suggested that the IS curriculum should be changed because of the recession. One response spanned two categories, resulting in an N of 38 when suggestions were divided into categories as indicated in Table 13.

Category of Response	Suggestions	
	#	%
Career-related skills/knowledge	18	47.37
Increased technical skills	8	21.05
Increased soft skills	5	13.16
Emerging Technologies	2	5.26
Online learning/training	2	5.26
Other	2	5.26
IS Cost Savings	1	2.63
	38	100

Table 13. IS Recruiter Suggestions for Curricula Changes due to Recession

Congruent with recruiter goals and mindset, nearly half of the IS recruiter suggestions for curricula changes dealt with preparing students for the workforce:

New Grads need to be taught how to sell themselves, and not feel entitled to a position. They need to learn how to source jobs, and to really think outside the main stream to find employment opportunities.

Not IS-specific, but there is some lack of dedication and follow-through present in the college-age applicants we've seen. Touching on practical, general topics such as workplace expectations and work ethic might be useful, if not already in place, to give students an advantage against the competition.

Its very important for students to know and understand how to adapt to any economic climate changes which can impact the recruiting markets.

Increased technical skills comprised 21% of the responses with suggestions for VB.Net, C#, math, programming, virtualization, database administration, security systems, interoperability between operating systems, and specialized software (especially for accounting) skills. One respondent suggested that "it may be advantageous to have more defined options around database design skills, coding, help desk support etc. that every graduate receives but unless specific work has been done extra curricularly (sic), they are still not qualified for most IS jobs."

Strengthening a student's soft skills was suggested 5 times (13%). A suggestion by one respondent identified both some desired skills as well as an industry-perspective reasoning for those skills:

The same skills that help an IS grad stand out are the skills that help them stay employed. In soft economies, those skills tend toward "soft" skills and away from "hard" skills. IS employees who can forge partnerships, build relationships, communicate effectively with the business, and find creative ways to manage costs are the most valuable to the organization. This includes facilitating meetings like JAD sessions, understanding higher-level project and portfolio strategies, motivating teammates, training others, succeeding despite ambiguity. Mastery of these skills is far and away more important than understanding why the enterprise should move from J2EE to .NET, which is something they can learn overnight.

The remainder of the respondent suggestions can be inferred from the category headings in Table 13; however, some additional suggestions were worth noting. Three suggestions specifically mentioned a move toward more online learning/training/education and the need for employees who knew how to use the associated technologies. One suggestion for online training included cost savings as a reason for online training. Another respondent addressed cost savings from a lean perspective:

Many companies are facing a time where downscaling their IT systems is a must. We can't have students coming out of school with a thirst for new/cutting edge technology without at least some knowledge of what it is to be "lean".

4.4.4 IS Recruiters' Perceptions Regarding Industry Trends

Forty (17.24%) respondents provided usable responses ("Unsure" responses were omitted) to the question about what IS-related trends should be addressed by the business school and the IS industry advisory committee. Their comments were divided into five categories as indicated in Table 14.

IS recruiters indicated the following current technologies/skills were important to their organization: user interface and user experience design, software as a service (SaaS), ERP, supply chain, Java, DB2, SQL, Internet applications, mobile technologies, and collaboration technologies. Newer content and technologies (as well as how they will change business and our daily lives) included

cloud computing, health care information systems, Twitter, blogs, Web 2.0, Open Source computing, service-oriented architectures (SOA), Skype-types of communication, and Apple OSX.

Trend	Suggestions	
	#	%
Current Technologies	11	27.50
New Content/Technologies	10	25.00
Student Internships and Employment	9	22.50
General Business Content	8	20.00
Specialized Training Needs	2	5.00
	40	100

Table 14. IS Recruiter Suggestions for Industry Advisory Committee Discussion

Nearly 25% of the responses referenced internships or preparing students for employment. The main idea behind the suggestions was that internships and new positions would be sparse, so students should either take unpaid internships or become entrepreneurs and industry members should consider funding IS internships. Respondents also suggested that students strengthen their interviewing skills and develop an awareness of their unique traits and characteristics.

The general business content that IS recruiters indicated was important for IS advisory committees to discuss included vendor management, project management, budget management, customer service and relations, business continuity planning, leadership skills—with both onshore and offshore teams, systems development life cycle (SDLC), how to understand what upper management needs to make hardware and technology purchasing decisions, how to articulate a business case for investing in technology, how to define business requirements, and general people skills. Recruiters also identified as discussion topics specialized training needs related to governmental requirements in general and the Health Insurance Portability and Accountability Act of 1996 (HIPAA) for health care information systems in particular.

5. DISCUSSION AND CONCLUSIONS

The quantity and span of industry sectors represented by the participating IS recruiters in this study should be typical of IS recruiters at universities throughout the United States. Therefore, the data provided by this study can be used by IS faculty and Career Services departments to prepare students in IS-related fields.

A possible limitation of this study was that the student sample was drawn from only IS majors and minors. Therefore, we do not have data for the percentage of students who dropped the IS major or minor (due to the recession or other reasons). However, the data supporting students' decisions to add an IS major or minor was encouraging and supported existing literature indicating growing IS enrollments for programs which had implemented curricular revisions after the dot-com bust. The prevalence of students

changing from a CS to an IS major demonstrates students' recognition of the risks associated with outsourced computer-programming jobs and the need to supplement their computer skills with solid business skills included with an IS degree. Further, nearly 16% of the students surveyed had recently either added an IS minor or changed their minor to IS. These findings indicate that IS students are recognizing the need to strengthen their general business skills in order to become more marketable and non-IS students are recognizing the marketability of an IS minor.

Another possible limitation of this study was the use of IS recruiters rather than IS managers or CIOs. Responses by IS recruiters were probably more employment-oriented than might be expected from IS managers or CIOs. However, the decision to target IS recruiters was prompted by the assumption that recruiters would have a good knowledge of organizational and IS budgets as well as anticipated staffing plans. Additionally, IS recruiters are uniquely positioned to know both the IS needs of the organization and the strengths/weaknesses of the programs providing graduates for the organization.

The IS recruiter responses comparing organizational versus IS budgets indicated an organizational tendency towards protecting IS budgets. Although respondents anticipated decreases in both organizational and IS budgets, the cuts at the organizational level were anticipated to be larger than at the IS level. This finding suggests that organizations are recognizing the strategic advantages that IT investments can provide. What is not known is how much of the IS budget is for technologies (IT) versus IS staffing.

IS staffing was addressed in a series of questions about layoffs, new hires, contractor hires, and internships. The data comparing organizational versus IS layoffs and new hires suggests that organizations will try to protect their current IS staff (including IS contractors) but might be unable to hire new IS graduates. Adding to this is the likelihood that established IS professionals will stay employed until the stock market (and related retirement funds) rebound. The trickle-down effect of maintaining the existing IS staff level (rather than increasing it) also impacts internships. As indicated by the data, IS internships will not be as readily available as they have been in the past. The perception of fewer internships and jobs is reinforced by IS recruiter suggestions that students should make themselves more marketable and learn how to adjust to economic swings.

Perhaps of most interest to IS faculty and Career Services is the difference in perceptions between IS students and IS recruiters. Generally speaking, students were far more optimistic about internship and employment opportunities than were IS recruiters. Whereas students perceived IS budgets would increase and organizations would increase the number of employees and interns, IS recruiters more knowledgeable of the factual status of organizational plans anticipated either no changes or decreases in both budgets and new hires. If the Federal Reserve's prediction of a five-year unemployment recovery is correct, then the surge of students representing the IS-program enrollment growths could convert into a surplus of IS graduates. However, if the industry "No Change" indicator for hiring employees and interns represents a strategic growth plan for IS staffing, then industry demand for IS graduates could continue to exceed

the supply. IS faculty and Career Services personnel will need to continue to monitor IS staffing in industry.

Comments from both IS recruiters and IS students confirm the delicate balance IS faculty must maintain between providing technical and business content. Similar to prior research on industry-desired skills of IS graduates, IS recruiters indicated a need for technical students with a solid business background and excellent interpersonal/team skills; some IS students indicated a desire for more technical classes. As indicated in the section on Enrollment Trends in IS, strong business skills are not a substitute for strong technical skills. The technical skills are given requirement; industry also wants IS applicants to understand (a) how IS is integrated throughout the organization to achieve strategic business goals and (b) how to communicate with decision makers regarding IS needs/purchases. Ideally, students would double-major in IS and another area (business or whichever field interests them). Practically, most students are anxious to graduate and start earning an income; double-majoring would prolong their graduation.

The fact that nearly 50% and 15% of the suggestions by IS recruiters and IS students, respectively, for curricular changes involving career-related information suggests the need for a stronger relationship between IS departments and their university's Career Services department. The sample comments provided in the Results section typify the suggestions in that category: all were tailored to increasing a student's marketability, interviewing skills, and ability to adapt to changes in economic fluctuations impacting the workforce. Given the current struggle to provide sufficient coverage of IS content (including staying abreast of emerging technologies), IS faculty will likely not attempt to duplicate the efforts of their Career Services department.

The topics IS recruiters suggested that IS faculty discuss with their industry advisory committee members presented no surprises. IS faculty are keenly aware of emerging technologies and are continually updating the curriculum to integrate new technologies with proven business practices. The need for better communication and team skills in IS applicants is a recurring topic in industry/faculty discussions. Another recurring discussion topic is the industry challenge of employing Generation Y workers (as evidenced by one recruiter's comment reported in the Results section). IS faculty witness the same entitlement attitude, diminished work ethic and lack of follow through in the classroom that our colleagues in industry lament.

In conclusion, students' optimistic perceptions vis-à-vis availability of IS internships and employment might be countered by a harsh reality of scarcity of such positions. The findings from this study indicate that although IS is not recession proof, existing IS staff do enjoy a certain level of protection from economic downturns. Furthermore, since IT investments have been shown to augment firm profitability through substitution of labor capital and employers value IT-skilled workers, then an argument could be made for (a) business students to increase their marketability via adding an IS minor and (b) IS students to increase their marketability via adding a business-area minor (e.g., management, marketing, accounting, finance). With the unemployment rate expected to increase throughout 2009

and into 2010 with projections for a possible five-year recovery period, now would be a good time for students to delay graduation for one or two terms in order to increase business knowledge and strengthen required technical skills. Additionally, now is a good time for IS faculty to promote the IS minor across the campus to areas represented by industry sectors negatively impacted by the recession but dependent upon a strong IT infrastructure. Students knowledgeable in their content area and also familiar with IS will be more marketable.

Another recommendation is to strengthen relationships with both industry and Career Services representatives by providing opportunities for guest presentations. Guest presentations could facilitate student transition from school to the workplace (in addition to serving as a reality check about the job market). Additionally, such presentations serve to confirm to students the value of the IS content and skills they are learning.

A final point borne out by this study is that the lessons learned after the dot-com bust vis-à-vis curricular redesign do not need to be relearned. The recession does not require another major change in what we teach. A strong relationship with an active industry advisory committee and a commitment by IS faculty to continually revise and improve the curriculum to meet industry needs enables IS departments to grow and remain competitive. A competitive IS program provides the caliber of employees sought by industry, thereby reinforcing the importance of continual program improvement. Providing our students with strong IS and business knowledge and skills will make them more competitive in the marketplace, especially in situations where IS internships and jobs are scarce.

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APPENDIX A

(Note: formatting changed to fit journal page requirement)
[Name of University], [Name of College], [Name of Department]
Information Systems Recruiters
Current Business Climate Survey - Spring 2009

Please complete the following 14-question survey regarding the impact of the recession on IS-related issues in your organization. The purpose of the survey is to better help the IS faculty respond to industry needs. Additionally, aggregate results from this survey may be discussed at the Fall 2009 meeting of the Management Information Systems Industry Advisory Committee meeting.

Your identity is anonymous even to the [University] faculty. You can optionally include your name, title and organization at the end of the survey.

Thank you very much for your continued support of the [Name of the department] at [Name of university].
[Researcher Name], [Name of the department]

1. Type of Business:

- Manufacturing
- Professional Service
- Retail Service
- Nonprofit
- Public Sector Government
- Public Sector Education
- Private Sector
- Agricultural
- Utility
- Transportation
- Other, please specify:

Organization-wide

2. How does your planned 2009 organization-wide spending compare to 2008?
3. What is your organization doing/planning with regard to layoffs and hiring in 2009?
4. What is your organization doing/planning with regard to contractors in 2009?

Organizational Information Systems

5. What is your organization doing/planning with regard to IS layoffs and hiring in 2009?
6. What is your organization doing/planning with regard to IS contractors in 2009?

College Recruiting for Management Information Systems Majors

7. How does your organization's 2009 campus IS recruiting efforts compare to 2008?
8. How much IS interviewing on campus will your organization be doing in 2009?
9. How many IS graduates does your organization plan to hire full-time in 2009?
10. How many IS interns does your organization plan to hire in 2009?
11. What percentage of your 2009 campus recruiting efforts will be conducted at [name of university]?
12. Does the current recession change what should be taught in the [name of university] IS curriculum?
13. What IS-related trends should be addressed by the [Name of department] and IS Industry Advisory Committee?

Optional: Name, Title, Organization, Site

APPENDIX B
List of “Other” Industries Participating in Research

#	Other Industries
2	3rd Party Transportation/Logistics
1	Aerospace
1	Aerospace/Aviation
1	Aerospace/Defense
1	Broadcasting - Radio stations
1	Certified Public Accounting Firm
1	Chemical Manufacturing
1	Clinical Research
1	Computer Hardware
1	Construction
1	Consulting
1	Consulting - I provide HR service to smaller orgs
1	Custom Software Consulting
1	Education
1	Engineering R & D
2	Financial Services
1	For profit Social/Human Services
1	Government
1	Government contracted healthcare
4	health care
1	Health Insurance, both Government plans and private
1	Heavy Equipment
2	Insurance
1	IT/High Tech
1	Legal governing entity
1	Management Consulting
1	Maritime
1	Media
1	Medical
1	Military
1	Military Medical Officer Programs
1	PEO - All types of clients
2	Publishing
1	Radio Stations
1	Retail Wholesale
1	Semiconductor
1	Staffing - Business & IT
1	State resource management agency
1	Supply chain management
2	Telecommunications
1	Tourism
1	TV Production
1	Warehousing/wholesale
1	Website Design and Hosting



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