Market Segmentation of Information Systems Academic Programs

ABSTRACT: Past Information Systems (IS) curriculum studies recognize the importance of the practitioner's perspective and attempt to incorporate "real world" IS skill requirements within recommended IS model curriculum guidelines. While recent IS curriculum recommendations move towards a greater customer orientation, many practitioners still feel IS education programs are not producing the types of IS professionals needed on their job sites. This raises an important question: *Given the significant role that practitioners have played in recommending new curriculum designs, why are IS practitioners not satisfied with the quality and skill training of IS graduates?* While many reasons, such as poor curriculum implementation and the rapid change of technology, may contribute to this problem, a significant contributor may be that blanket adoption of national IS model curriculum fails to recognize the basic marketing concept of segmentation. We posit that understanding the customers of IS academic programs in segmented markets should lead to better designed curriculum and accordingly, deliver students that better meet specific market demands. Rather than simply ranking IS employer skill preferences on a national basis, this study relies on the marketing reference discipline for guidance in introducing a market segmentation model and an implementation approach to help bridge the gap between academia and practitioners.

Choong C. Lee
Franklin P. Perdue School of Business
Salisbury State University
Salisbury, MD 21801, USA

William J. Kettinger
College of Business Administration
University of South Carolina
Columbia, SC 29208, USA

Jean-Pierre Kuilboer
Management Sciences & Information Systems Department
University of Massachusetts at Boston
Boston, MA 02125, USA

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INTRODUCTION

Information Systems (IS) curriculum may be the most dynamic within colleges of business. Constantly changing technology and business demands for new applications raise major challenges for IS faculty in curriculum development. In order to fulfill IS employer expectations, it is widely accepted that IS curricula should match the needs of IS employers, who are, in fact, the customers of IS academic programs [6, 8, 14, 16, 21, 23, 28, 35]. However, even given academics' noble attempts to improve the IS curriculum, practitioners' dissatisfaction with new IS graduates is well recognized. In fact, several studies reveal that some IS employers consider recent graduates as unemployable and unqualified [1, 4, 39]. Often the quoted explanations deal with the constant changes of the computer field [24, 29, 37], contradictory advice from IS practitioners [5, 35], and a delay in the curriculum transition [35].

To cope with these IS curriculum design difficulties, many IS researchers focus on finding the best set of IS knowledge and skills and try to incorporate them into their IS curriculum [2, 13, 15, 25]. One primary goal of IS educators is to create a well-balanced IS curriculum that can incorporate both technical and managerial categories of knowledge [8]. However, this ideal approach is often confronted by another reality, business schools often limit the number of IS courses offered or required to satisfy general business course requirements. An expanded set of IS classes, satisfying all technical and managerial skill needs, typically does not fit into a regular four year college education. Some trade-offs are inevitable. In making these trade-offs, some IS programs specialize their curriculum by limiting their programs based on faculty interests [6, 19, 21, 24, 29], or by splitting the program into multiple tracks [37]. Another approach is to adopt a generic, national curriculum guide. While these curriculum guides are useful, most schools do not follow them completely. Typically schools cannot offer all the suggested courses because of limitations in the number of courses required for majors. Second, faculty may believe that the recommended curricula are not updated rapidly enough to meet changes in the field [33, 37]

Ultimately, the true litmus test of any IS program is whether it can place its graduates. Several studies have suggested that differing job positions held by IS managers (i.e., CIO vs. Programmer) result in different perspectives on preferred IS skill sets [3, 37]. Others have explored the importance of different IS skill sets as perceived by IS educators and IS practitioners [16, 23]. One popular debate is whether IS managers seek more technical or interpersonal (managerial) skills in graduating students. The apparent demand for dual-skilled (technical and managerial/ interpersonal) [6, 18, 28] IS graduates is, however, often in contradiction with the reality of IS employer hiring practice; whereby employers claim to prefer new employees who have advanced interpersonal/managerial skills, but screen job candidates based upon their technical skills [16]. In a course limited curriculum, this can lead to tough decisions as to what skills will be targeted and what courses will match perceived local employer requirements. In addition, many other factors are suspected to affect IS employer job skill preferences. Such factors include work experience, training and background of the employer, size of the company or department, technical configuration, type of industry, location of company and so on.

To address these issues, it may be time for IS faculty to begin to define their niche market, distinguishing how different characteristics of future IS employers within an individual school's marketplace affect preferences for its specific IS graduates. To some extent, schools have been doing this for some time. However, these efforts have been based more on intuition than a systematic analysis of market. In order to have a clearer picture of IS job markets, we may need to begin to treat the job market for IS graduates as segmented and to determine unique dimensions of IS employers within these niche markets.

To move further in this direction, IS department heads and faculty need to utilize existing tools and techniques to identify their special niche market(s) and determine IS employers' preferences regarding IS skills. In order to investigate a "segmented" view of the IS job market, we offer a study that further expands the current market-oriented approach, by adapting market segmentation concepts from the marketing discipline. We seek to extend this line of inquiry by providing a conceptual model that distinguishes types of IS market segments, as well as provide a pilot implementation of the model for a MIS program in a U.S. based four year university.

SEARCH FOR THE BEST IS CURRICULUM MIX: MARKET SEGMENTATION

Responding to the demands of a changing IS job market, IS academics and practitioners have periodically gathered together to create new curriculum. The Information Systems 95 (IS'95) initiative is the most recent of these IS curriculum reform efforts [15]. In a collaborative effort by the Data Processing Management Association (DPMA), the Association for Computing Machinery (ACM), and the Association for Information Systems (AIS), IS'95 recommends IS courses along with course objectives and rationale for selecting individual courses of study. IS'95 builds upon the experience gained since the publications of DPMA's IS' 90 and ACM's 1982 study.

While the main structure of the suggested IS'95 model curriculum may not be a surprise to IS academics, the detailed course elements, such as main topics in each course, are well articulated to enrich and update the content of the most prevalent IS curricula. The comprehensive findings made by IS'95 are extremely valuable in determining general programs of study and in highlighting a common body of knowledge recognized relevant on a national and, in some cases, international basis. IS 95's recommendations are well thought out and have been reviewed by many qualified reviewers. Specific recommendations outline proposed depth of IS knowledge, curriculum areas and sub-areas, course learning units, detailed bodies of knowledge and course requirements. However, even given the comprehensiveness of such model curricula, they do not propose to satisfy the requirements of unique markets in which individual IS programs compete. As models they provide important frames of reference that help guide individual schools as they customize their own IS academic programs.

In fact, as much as we strive to establish global standards through models, IS academic programs will differ. These differences are reflected in the nature of the students they recruit, the subject matter they cover and by the nature of local and regional employer preferences. Thus, many IS department heads and faculty are uncertain of the proper balance between the nationally recommended curriculum reforms and the courses perceived by local IS employers as being most important. The dilemma is two fold: (1) due to limited credit hours, IS departments often cannot offer a full variety of recommended IS courses to satisfy all generic IS employer preferences [37]; (2) when the IS program is spread "too thin", academia can only offer only a superficial level of understanding, with neither strong vocational skills nor solid conceptual frameworks that may supplement on-the-job training and experience. Logically, these two problems are strongly interrelated and the addressing of the second would suggest better designs of customized IS curriculum skill sets that meets employer demands with students attaining both solid problem solving and technical skills.

Some past marketing-oriented approaches in IS curriculum research, have implicitly adopted the market segmentation approach by focusing on a certain geographical location of the IS job market [21, 24, 29]. However, the lack of a structured methodology of market segmentation to customized an IS curriculum marketing mix may have prevented full understanding of IS job segmentation. In marketing research, a niche market is not solely defined by geographic location but also by other characteristics. In IS, a niche market might be defined by the IS skills needed by practitioners, the type of positions available, the type of industry or the type of system platform. Some past studies have categorized how the IS job market may differ by job position [37] and suggested different niche approaches for differing job positions. These studies advocate IS programs that track the demand for skills applicable to their target market(s) and then adapt them to specific IS curricula. These efforts might be viewed as early efforts towards IS job market segmentation.

Segmentation research in marketing has a long tradition dating back to the 1960s [22]. The main thrust of this marketing strategy is to identify distinct customer groups that have homogenous needs [38]. This approach may lead to new product or service opportunities. Based upon an understanding of opportunities, a new marketing mix can aim at satisfying a predetermined market niche. While the definition of a market can be broad and generic, most companies quickly narrow their focus to target markets, which are a subgroup of people or organizations sharing one or more characteristics that respond to a marketing mix in a similar way [22]. Today, market segmentation plays a key role in the marketing strategy of almost all successful organizations [9, 11, 30, 36]. It should be remembered that an organizations inability to reorient itself by being flexible to customer needs accounts for the failure of many giant companies to match the success of the smaller, more niche -oriented firms.

Traditionally, industrial market segmentation, which focuses on organizational buyers, is distinguished from the more traditional consumer market segmentation, which focuses on individual consumers [10, 26]. While some assert that a segmentation technique is equally applicable in both cases, the difference between them is the segmentation criteria, the base variable, as well as descriptors. A segmentation base has been defined by Choffray and Lilien [7] as a criterion used to group potential or actual customers. A segment descriptor as defined by them is a variable or characteristic that is linked to segment membership and is relevant for marketing strategy formulation and implementation.

Our focus is placed on the industrial market area, since hiring decisions would be similar to organizational purchasing practices. Research on industrial market segmentation offers several criteria for segmenting customers, including: demographic descriptors (i.e. geography, type of industry, and account size), product end-use or application, buying situation (i.e. channels of distribution possibilities), customer benefits, customer buying behavior (i.e. brand loyalty, reasons for purchase, past purchases), and customer decision making style (type of decision makers) [17, 30, 36]. A market can be segmented using one of these base variables or as a combination of base variables. The current trend in marketing is toward using more, rather than fewer, variables to segment markets [22]. However, marketing research also seems to suggest that most consumers use only a few important determining dimensions. Therefore, the task is to try to understand the few determining dimensions of a group of customers amid all the possible determinants

of market segmentation. After identifying a target segment(s), the selection of descriptor variables is equally important in linking segment profiles with a firm's marketing strategy.

AN IS JOB MARKET SEGMENTATION MODEL

Although a few segmentation models in marketing suggest a narrow focus of selecting base variables as well as descriptor variables, our intention is to provide a broader, more conceptual, but also practical, model. In this context, we define the necessary steps in utilizing segmentation strategy in the IS job market, rather than conducting a large-scale baseline study that identifies an exhaustive list of base or descriptor variables. We adopted the Doyle and Saunders' Market Segmentation and Product Positioning Model and adapted it to an IS job market setting. A brief description of the modified model (refer to Figure 1) and its implications for the IS job market are provided below.

IS JOB MARKET SEGMENTATION MODEL (Figure 1 About Here)

Market Segmentation and Positioning Model
1. Define objectives of IS job placement
Based on situational factors such as resources, size, mission or strategic planning, IS faculty and administrators together need to define their markets and objectives. This step is important because it will strongly influence the later segmentation and positioning of the IS curriculum. For example, if the IS department intends to be a major market provider which produces a massive number of IS graduates and places them in all possible IS job markets, then a normative market segmentation strategy would be necessary, leading to an extensive survey of general lists of base variables and descriptor variables in the generic IS market.

On the other hand, when an IS department aims to supply a local IS niche market of programmer positions with a limited number of IS graduates, determining market segments will be simpler and less extensive. Therefore, this first step governs the following steps in the model by defining the domain of IS job market(s) and is very critical to the whole process.

2. Determine IS job market segments
Here we develop a set of macro-segments of the IS job market that are likely to react differently to an IS graduate. In consumer and industrial market cases, real-world segmentation studies have followed one of two typical research patterns: first, a clustering-based segmentation design in which segments are determined on the basis of a clustering of respondents on a set of "relevant" base variables. A few market research tools, such as cluster analysis or discriminant analysis, have been widely used in this quantitative, empirical approach; second, an a priori segmentation determination in which management decides on a basis for segmentation, such as business objective, customer type, product purchase or prior experience with customers [38].

In an a priori segmentation approach, the size and other characteristics (demographic, socioeconomic, purchase, and the like) of the segments (c.f. descriptor variables) are also surveyed and analyzed. Contrasting to a deductive clustering segmentation approach, the results of the first step would significantly influence the domain of target segment(s). It can be an appealing approach despite the danger of excessive subjectivity, in the sense that segmentation is more of a strategic problem of resource allocation [20].

Both approaches can be applied to an IS job market setting. In the case of the first empirical approach, many observable characteristics of IS employers can be used to segment an IS job market, using a sample of IS employers. In the IS job market, hiring decisions may depend less on the internal psychology or socioeconomic characteristics of decision makers and more on the external, organizational characteristics of IS employers. This tendency is noticed more in industrial marketing than in consumer marketing [16].

Once the segments are identified or defined using one of the two approaches above, the unique characteristics of each segment need to be fully understood. By using a quantitative approach like cluster analysis with base variables, these variables also can be used to describe the differences among segments. In addition, a list of descriptor variables can be used to depict each segment in more detail.

3. Evaluate attractiveness of alternative segments
After identifying IS market segments, IS faculty need to evaluate the opportunities and risks they represent. Each must be evaluated to determine the size and growth of the segments. In addition, the analysis of possible competitors in each segment would be useful to determine the attractiveness of a segment.

4. Select target segment(s)
The number of segment(s) in which the school will compete will be determined as a result of step three. At this stage, complete profiles of the target segment(s) are drawn up. Unique organizational characteristics (c.f. the type of industry, the size and structure of the firm) can be identified for the target segment(s).

5. Develop a positioning strategy
After choosing target segment(s), IS faculty must decide how they will meet IS employers' skill requirements within that segment. Their approach should be unique and sustainable based on the characteristics of the selected segment. In addition to the organizational characteristics, the technical characteristics for the type of IS skills needed, the type of system platform, CASE tools, and main programming languages of the target segment should be investigated. Faculty must produce a comprehensive and detailed list of technical, business and system knowledge requirements in the target segment [34]. Ideally, a sample survey would be required to collect the needed information.

6. Develop the IS curriculum

After determining IS skills needed in the target segment, the IS curriculum should be redesigned to reflect market requirements. Consistent decisions must be made not only about IS courses but, also on the goals and contents of these classes, including specific in-class software, and hardware. Planning for new IS faculty hiring also can be based upon a new IS curriculum design in the target segment.

7. Validating the strategy

It is essential to validate the previous analysis and modify the plan on a regular basis. Follow-up research on the market is necessary to test the reliability and effectiveness of the segmentation strategy and the appeal of the new IS curriculum. An alumni survey should be made every year and another market segmentation analysis should be undertaken every three to five years or as economic conditions warrant.

A Pilot Implementation of the Model at Niche University

The application of the model previously described, is illustrated with real data from an actual study. The study site is a public university located in the mid-Atlantic region of the United States with 6,000 students. The AACSB-accredited business school alone has 2,000 full-time undergraduate and graduate students. The business school has 50 IS major students and four IS professors. Recently with the arrival of a new department chairman, the faculty has been revising its mission, goals, and curriculum. As part of this effort, one of the authors initiated a pilot study of IS job markets for the school's IS graduates. Hereafter, the university in this example will be called Niche University (Niche U.).

Market Segmentation Steps Taken at Niche U

1 & 2. Define objectives and Determine market segments

From historical data covering the last five years, Niche U. realized that more than 90% of its IS graduates found their first job in either the Mid-Atlantic or Southeastern areas. The majority of incoming students were recruited from these same areas. Considering the school-wide mission, resources allotted for the IS department, and historical data about Niche U. students, Niche U. decided their main geographic market was in these areas.

In addition, Niche U. had been reviewing their current curriculum to determine if they were meeting the IS skill needs of employers in their marketplace. First, as a pilot study, Niche U. was interested in relative emphasis between technical and managerial skills among IS employers. The decision to customize their IS curriculum, based on the better understanding of the local tendencies, was on hold until further market analysis was completed.

Based on the analysis derived from steps 1 and 2, an a priori segmentation determination was made that placed Niche U. with two potential market segments: a technical skills-demanding-segment versus a managerial skills-demanding-segment. Both within the regional Mid-Atlantic and Southeastern regions.

3 & 4. Evaluate attractiveness of alternative segments and Select target segment(s)

To analyze the attractiveness of these two segments, a series of structured face-to-face interviews was conducted with 155 IS employers between 1993 and 1994 in the Mid-Atlantic and Southeastern regions. The results of the interviews were content-analyzed by the three authors. Thirteen variables were generated through the content analysis (refer to Table 1). Details of data collection and analysis are provided in Appendix 1.

The intended outcome of the data analysis was to determine the distinctive characteristics of the a priori segments. Descriptive findings and significant results of chi-square tests are summarized in Tables 2, 3, and 4. For instance, our survey placed 82% of IS professionals in small to medium companies, 66% came from service companies. Our study indicated that approximately 88% of IS mangers interviewed had a least a college degree and were placed in 19% of senior management positions, 61% of middle management and the rest were in low or other positions. Only 41% were using client server technology. Our research also indicated 64% of the companies surveyed used 4th generation languages and only 40% outsourced some or all of their computing requirements.

Interestingly, our findings show that the size of the technical skill preference segment is much larger than the counterpart, managerial segment, accounting for 61% of all subjects. This supported the IS faculty's general belief that employers of Niche U.'s students demanded strong technical skills of graduates. This opinion had been previously derived from alumni feedback and informal contact with local IS employers. Based on these results, the "technical skills-demanding" segment in the Mid-Atlantic and Southeastern regions was chosen as the primary target segment. Further analysis was performed to identify any distinctive characteristics of this segment relative to the "managerial skills-demanding" segment.

5 & 6. Develop a positioning strategy and Validating the strategy

Data analysis shows that organizational characteristics are much more relevant than individual IS employer's characteristics in determining IS skill preferences at Niche U. In terms of organizational characteristics, three variables show significant chi-square statistics in association with the IS skill preference variable (refer to Table 4). In essence, firms with larger IS departments, in non-service industries and users of 4GL's were more likely to have preferences for managerial skills. Conversely, a firm in the service sector, with a small IS employee group and no use of a 4GL is found to emphasize more technical IS skills than managerial/business IS skills (refer to Table 4).

Implications from the findings had to be integrated into the positioning of Niche U.'s IS curriculum. For example, the consideration of dropping the requirement of a programming language for the *System Analysis and Design* class has been discarded and, in fact, consideration of additional programming courses are being considered. In another example, a supplementary casebook, which

illustrates a specific IS setting in the service industry, was chosen based on interview results. Also, a prototyping method using simpler, PC-based CASE tools, which may appeal to a small IS group, was emphasized. In general, given a limited number of potential course offerings, it was decided to move away from additional course offerings in strategic and behavioral IS areas.

While the results discussed above had important implications for Niche U.'s IS curriculum, it is realized that further data analysis with a more comprehensive list of descriptor variables and a larger sample is required to build a detailed IS curriculum positioning strategy. Feedback from a larger scale research effort should lead to further refinements in Niche U's IS curriculum and increase the confidence of the implementation of the market segmentation strategy.

CONCLUSION AND IMPLICATIONS OF STUDY

In summary, the objective of this project was to contribute to a general body of knowledge on curriculum development by developing an IS job market segmentation strategy for universities' IS programs. The model and other concepts from market segmentation studies were introduced into the IS job market and the model was tested in a real setting.

This study provides additional insight into the need for customization of curricula to better serve discriminating market segments. Reading customers' minds is not easy without a better understanding of the factors underlying hiring preferences in a specific target market. At this time, IS faculty may be highly receptive to the concept of market segmentation and positioning. Tougher job market conditions may trigger a high felt-need for a marketing oriented approach over an informal, insight-oriented approach in curriculum design. Successful implementation of the market segmentation approach may help new IS curriculum guidelines, such as IS'95, by maximize their practical usefulness as overarching frameworks. For example, based on the identified IS skill requirements in the target market(s), IS faculty can use IS'95 as a comprehensive reference manual in packaging courses and their content in a more customized way.

Market segmentation is a customer-oriented and effective marketing technique but, it should be implemented with some caution. First, determining appropriate breadth is a challenge. Too narrow a definition of the market will limit an IS program's opportunities - but too broad a definition will make one's efforts and resources seem insignificant [12]. Theoretically, an individual market may be behind the times, resulting in a segment demanding antiquated teaching. College academics should not be too short-sighted, but should distinguish their teaching from merely providing technical training to meet immediate job needs and, also look ahead to necessary changes in the local market niche. Short-run orientations may lead IS programs into declining market segments and prevent them from seeking out innovative opportunities.

The rapidly changing character of the IS job market dictates that schools not only employ market segmentation techniques, but also think of market segmentation as a continuous process. **Drastic technology changes, high IS personnel mobility, or a frequent reshuffing in IS industry would be some factors behind the IS job market. Continuous monitoring on the market should be essential.** Based on a periodic reevaluation of segmentation decisions and curriculum design, a thorough understanding of our customer needs in different segments will permit us to customize our IS graduates to enter varied and diversified IS markets.

A clear implication for IS curriculum research is the urgent need to identify the base variables in IS job market segmentation. Through a nation-wide survey using these variables, all possible IS job market segments can be identified and depicted in a research framework. Possibly, IS curriculum researchers can reorganize and redirect generic curriculum design efforts, such as IS'95, into a search for nationwide IS job market segments in order to incorporate them into the framework of a market segmentation model. Our model provides a stepping stone to move beyond reactive approaches to understanding customer demands towards establishing a more dynamic supplier-customer relationship. We must proactively define IS job market segments and define our IS curriculum according to individual market niches. To this end, we encourage further research on this topic.

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APPENDIX 1. DATA COLLECTION AND ANALYSIS

Thirteen variables have been generated through content analysis. They are grouped into two categories: individual characteristics and organizational characteristics (refer to Table 2 and 3). First, individual characteristics are: IS rank, work experience, duration of

education, college major and IS skill preference. Second, organizational characteristics are: size of location, size of firm, size of IS department, type of industry, use of client-server based system, use of outsourcing, and use of fourth generation language.

Upon the completion of data codings by the three authors, the interrater of reliability was determined. One of the simplest and most popular methods, percentage agreement, was used to determine the reliability. For all 13 variables, the ranges of reliability varied, showing some marginal acceptances (from 0.62 to 0.78). Discrepancies were resolved on a unanimous rule basis. Only responses that were agreed by all three authors, were considered to be valid. A final validated data set was subjected to a preliminary descriptive analysis and a series of chi-square tests in order to identify important descriptors that affect the segments of IS employer preferences on technical versus managerial IS skills.

Table 1. Description of Research Variables

[Dependent Variable]
1. Type of IS Skill Preference: Technical Emphasis and Managerial Emphasis

[Individual Characteristics - Independent Variables]
2. IS Rank: Organizational rank of subject - High, Middle, Low level
3. Work Experience: Number of Years in the IS business - 0-5, 5-10, 10 or above
4. Education Level: High School, College, Graduate School
5. College/Graduate Major Areas: Technically-oriented major, (i.e. computer sciences etc.), Balanced major (i.e. MIS, CIS, AIS etc.), and Pure Business major (i.e. Finance, Marketing etc.), and the others
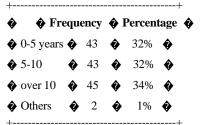
[Organizational Characteristics - Independent Variables]
7. Size of Location: Based upon the population, large, medium, small city
8. Size of IS Department: Number of IS employees - small, medium, and large
9. Size of Company: Number of employee - small, medium, and large
10. Type of Industry: Manufacturing sector versus Service sector
11. Use of Client/Server-Based IS Infrastructure: Use of PC-based Client/Server platform versus mainframe/mini computer based
12. Use of Outsourcing: Use of any type of outsourcing such as programming or operation
13. Use of 4th Generation Language: Use of any type of 4th generation language such as Natural, Powerscript

Table 2. Personal Demographics

1. IS Rank

	Frequency	Percentage
High	25	19%
Middle	80	61%
Low	25	19%
Others	2	1%

2. Work Experience (the number of years)

	Frequency	Percentage
0-5 years	43	32%
5-10	43	32%
over 10	45	34%
Others	2	1%

3. Level of Education

	Frequency	Percentage
Highschool	13	10%
College	74	60%

◆ Graduate ◆ 35 ◆ 28% ◆

◆ Others ◆ 3 ◆ 2% ◆

+--+

4. College Major Areas

+--+

◆	◆ Frequency	◆ Percentage ◆
◆ Technical ◆	47 ◆	42% ◆
◆ MIS/CIS ◆	25 ◆	22% ◆
◆ Business ◆	23 ◆	20% ◆
◆ Others ◆	16 ◆	14% ◆

+--+

5. Type of IS Skill Preference

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◆	◆ Frequency	◆ Percentage ◆
◆ Technical ◆	83 ◆	61% ◆
◆ MIS/CIS ◆	53 ◆	39% ◆

+--+

Table 3. Organizational Demographics

1. Size of Location

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◆	◆ Frequency	◆ Percentage ◆
◆ Large ◆	8 ◆	7% ◆
◆ Medium ◆	49 ◆	47% ◆
◆ Small ◆	46 ◆	44% ◆
◆ Others ◆	5 ◆	2% ◆

+--+

2. Size of IS Department (the number of IS employee)

+--+

◆	◆ Frequency	◆ Percentage ◆
◆ Large ◆	24 ◆	24% ◆
◆ Medium ◆	36 ◆	36% ◆
◆ Small ◆	38 ◆	38% ◆
◆ Others ◆	2 ◆	2% ◆

+--+

3. Size of Company (the number of employee)

+--+

◆	◆ Frequency	◆ Percentage ◆
◆ Large ◆	15 ◆	16% ◆
◆ Medium ◆	58 ◆	56% ◆
◆ Small ◆	27 ◆	26% ◆
◆ Others ◆	2 ◆	2% ◆

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4. Type of Industry

	Frequency	Percentage
Manufacturing	39	34%
Service	76	66%

4. Type of IS Infrastructure

	Frequency	Percentage
C/S based	41	41%
No C/S based	59	59%

5. Use of Outsourcing

	Frequency	Percentage
Outsourcing	38	40%
No Outsourcing	59	60%

6. Use of 4GL

	Frequency	Percentage
4GL use	60	64%
No 4GL use	35	36%

Table 4. Summary of Chi-Square Statistics (on the type of IS skill preference: Technical vs. Managerial)

Variable Name	Chi-Square value	p-value
IS Rank	3.398	0.183
Work Experience	2.362	0.307
Education Level	0.091	0.956
College Major	1.509	0.680
Size of Location	1.985	0.371
Size of IS Dept.	8.595	0.014 *
Size of Company	0.943	0.624
Type of Industry	5.223	0.022 *
Use of C/S	0.013	0.910
Use of Outsourcing	0.421	0.516
Use of 4GL	5.186	0.023 *

[*] significant at .05

STATEMENT OF PEER REVIEW INTEGRITY

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