Restoring the Viability of PhD Programs in Information Systems: Getting Past Denial and Targeting Non-Traditional Markets

Kumar Kuldeep  
*Florida International University, kumark@fiu.edu*

Richard Welke  
*Georgia State University, rwelke@gsu.edu*

Ron Weber  
*Monash University, Ron.Weber@monash.edu*

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RESTORING THE VIABILITY OF PHD PROGRAMS IN INFORMATION SYSTEMS: GETTING PAST DENIAL AND TARGETING NON-TRADITIONAL MARKETS

Senior Scholar Consortium

Kuldeep Kumar  
City University of Hong Kong  
Florida International University  
RSM/ Erasmus University  
kumark@fiu.edu

Richard Welke  
Georgia State University  
rwelke@gsu.edu

Ron Weber  
Monash University  
ron.weber@infotech.monash.edu.au

Abstract

Since the early 2000s, the demand for IS PhD students has declined to the point where a critical oversupply of PhDs now exists. The reasons for this outcome are both multiple and complex. A primary driver for the oversupply of PhD students is the rapid and marked decline in IS/IT course student enrolments over the last five years. This decline in turn led to student/faculty ratios that were untenable. Attempts have been made to rectify this problem by laying off faculty. Yet imbalances remain and will constrain future academic hiring. At the same time, the pool of IS faculty has continued to increase due, in part, to an over-production of IS PhD students targeted for traditional IS faculty positions. In this paper, we consider the many factors, their complex inter-relationships, and the types and likely success of favorably altering these factors. We conclude that desired outcomes are not likely to occur in the short term. We propose some alternatives that could be adopted to IS PhD production, many of which are already in limited use in various institutions. We also describe the actions we believe are needed to achieve broader adoption of these alternatives.

Keywords: supply-demand imbalance for information systems PhDs, supply-side issues and solutions, demand-side issues and solutions

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Introduction

Since the early 2000's, the demand for information systems (IS) faculty in general, and freshly-graduated IS PhD graduates in particular, has eroded to the point where few are able to find positions at research-oriented universities. Moreover, in most industrialized economies the overall supply of those seeking academic positions well exceeds demand across academic institutions. While the level of the supply-demand imbalance is difficult to determine, posted position openings these days can easily generate fifty or more applicants.

An analysis was done on the available data from the AIS placement database (made available to the authors by the AIS office). This database goes back to April 2005 for applicants and February 2006 for position announcements. Additional historical data could not be located. The data extends until the time of this writing (mid-September 2007). To get an approximate sense of the data, recruiting intervals were taken to be from beginning of May until the end of the following April. The indicated number of positions excluded non-tenure, visiting, and adjunct positions. Not surprisingly, US applicants and position announcements dominate the data, so these were tabulated as sub-populations. Table 1 below shows the results:

<table>
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<tr>
<th>Table 1. AIS Placement DB Results</th>
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<tr>
<td>Total</td>
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<td>US</td>
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| **Position Announcements** |  |
|----------------------------|  |
| Total Universities | 10 | 107 | 50 |
| Total Positions | 9 | 123 | 64 |
| US Universities | 9 | 93 | 46 |
| US Positions | 8 | 102 | 59 |

Based on the data, the number of US applicants to US tenure-track positions (all levels) available is approximately two-to-one (2:1) for the 2006-2007 recruiting year. This ratio also holds, so far, for the 2007-2008 recruiting year. Due to the apparent incompleteness of the position announcements for 2005-2006, no comparable analysis can be performed. At this time last year, 48 positions were posted, and 121 applicants were listed.

The source of supply-demand imbalance generally is attributed to a substantial (some would say precipitous) decline in the number of students wishing to take non-required courses in the IS field (including graduate and undergraduate IS specializations and degree programs). The reasons for the initial drop-off were several, including a drop in demand for IS professionals that was fueled in the late 1990s by the Y2K conversion efforts, combined with the post-2000 dot-com bust. The subsequent effects were masked to some extent by the pipeline effects of students completing degree work in IS.

When lack of student interest persisted and the pipelines began to empty, IS departments seemed to go collectively through a “grief cycle” associated with the processing of any bad news—namely, denial, anger, bargaining, depression, testing, and acceptance (Kübler-Ross, 1969). Confronted with six years of declining enrolments and peak-to-trough drops in enrollment of sixty to eighty percent, most IS academic units have now passed the denial and anger stages. Only a few have passed the depression (final realization of the inevitable) or testing (seeking realistic solutions) stages. Instead, many remain in the bargaining stage, seeking in vain for a “quick fix,” such as better marketing or modest changes in curriculum. Further exacerbating the problem is a trend among business schools in some countries to reduce the number of required undergraduate and graduate (e.g., MBA) level IS courses. Also, a supply-side problem exists in terms of over-production of IS PhD graduates relative to current and likely future traditional academic faculty demand.

In this paper, we first examine a number of the factors underlying the demand-side and supply-side problems. We consider the resulting institutional problem of low student/faculty ratios in IS academic units, which will now act as a damper on future IS faculty hiring. Based upon this analysis, we evaluate our ability as IS academics to affect those factors that are negatively influencing both supply and demand factors. We consider what can be done, if anything, about these factors. We arrive, reluctantly, at the conclusion that the prospects are not bright for achieving dramatic changes in either the oversupply or lack of demand in the short term (the next three years) or the long term.
Next we explore non-traditional (for IS) sources of demand for IS PhD graduates. We believe these demand sources present an important opportunity to partially restore the supply-demand imbalance. This outcome will occur, however, only if changes are made in our traditional views of “successful” placements and how IS PhD students are prepared. In other words, we consider the “fifth P” of marketing–namely, positioning. Finally, we present some brief conclusions.

In developing this paper, several matters became clear(er). First, IS PhD demand is now a global rather than a regional or a country issue. We can no longer think about the problems or their solutions in the context of a single region or country, because PhD graduates move fairly readily across geographic boundaries. As a result, a number of problems arise, including the nomenclature associated with describing academic institutions and units, the peculiarities of how educational programs are delivered in particular countries, and the relative importance attached to the various factors discussed in this paper. Even the operative definition of “IS” varies from country to country. Some adopt more of a management stance, while others adopt more of a technology imperative. To the best of our abilities, we have attempted to be sensitive to these variances by trying to use generic vocabulary.

The reader also will note quickly that this paper is not driven by the distillation of large numbers of data and other published evidence. Rather, it is a reasoned set of opinions garnered by the authors in their many interactions around the globe with faculty, heads of units, deans, and the like. To wait for such data would be little more than a post-mortem. To limit it to the sparse data that is available would underestimate the complex, interacting factors contributing to the current and near-future problem and the likelihood of achieving remedies without changing course. For this we beg the reader’s indulgence.

Factors Underlying Lack of Traditional IS Faculty Demand

In this section, we consider the faculty supply and course demand for IS faculty. For most academic institutions, these factors are captured in the form of a student/faculty (S/F) ratio. While the value of this ratio can vary substantially across institutions, generally a norm exists within a college, school, or institute in which the IS academic unit is placed. Significant deviations from this norm often result in either increases or reductions in faculty allocations to the unit. Over the last few years, for nearly all IS academic units these days we suspect this ratio has gone from relatively high (compared to peer academic units, too few faculty relative to student demand) to somewhat to very low. This change has engendered a freeze on hiring and reductions in faculty numbers. Even with these measures taken, the ratio is still too low for many IS academic units (a situation that bodes poorly for near-term IS faculty hiring).

In the following subsections, we first examine the student demand side of the problem. We then consider other factors affecting the S/F ratio on the demand side, as well as other factors affecting IS faculty demand. In this regard, Figure 1 is an influence diagram that provides an overview of the factors and their interactions that we believe underlie the reasons why student numbers have declined, faculty demand has decreased, and a resulting “numbers gap” has developed in the traditional academic marketplace for IS PhD graduates.

Figure 1. IS Faculty Academic Demand Influence Diagram
Factors Affecting IS Student Program and Course Demand

Job Availability and Starting Salaries. While this factor was one of the original triggers for the decline in student course demand, particularly program majors, in many regions job availability and starting salaries no longer appear to be a problem. Student recruiters now have difficulty finding IS students to interview, let alone recruit. As a result, they are offering salaries well in excess of other business areas (e.g., marketing, management, and accounting). This outcome is not surprising given that comparatively few students are graduating from IS programs. Moreover, these factors should be a positive influence in attracting many more students into IS programs. This latter outcome does not seem to have occurred, however.

Perceived Profession Attractiveness. This factor is a constellation of perceptions that influence students directly and indirectly through their peers, mentors, parents, and relatives. In our discussions with IS department chairs and deans who have interviewed students about why they did not choose IS for their major (or minor), some insightful comments were offered by the students:

- Knowledge Stability. Unlike other business disciplines, the IS knowledge domain is perceived as constantly changing and thus requiring far more work to maintain minimum professional competency and continuing employment.

- Career Path Prospects. The effects of outsourcing and offshoring on current IT professional employment are well known, as well as the consequent mistreatment of those who were made redundant by their employers. Also mentioned is the perception of being on-call, 7x24. In general, students do not see good longer-term career prospects within IS, nor the ability to move laterally within organizations.

- Professional Recognition by Others. While IS and IT were once seen as exciting and those practicing as IS and IT professionals as worthy of modest esteem, increasingly the opposite now appears to be the case. For many students, the comic strip Dilbert reflects this view of geekiness and lack of self-respect.

- View of Current IS/IT Professionals. Adding further (negative) fuel to the perceptual problem is that IS/IT professionals themselves are stating increasingly that they would not recommend that their children (and friend’s children) pursue IS/IT as a career. These views are now widely and openly expressed on job sites, in blogs, and in discussion threads related to articles posted on the Internet about IS/IT employment. One snippet is taken from a presentation appearing in the e-publication eWeek in early September 2007:

  “The shine is off the apple. If the dot-com bust was the first nail in the IT work force's coffin and offshore outsourcing the second, the decline in student enrollments in computer science programs and a dearth of qualified candidates in specific skill areas may just be the last. Worse yet, many IT professionals admit that they themselves don't feel comfortable ushering their own children down a career path so fraught with land mines.” (Perelman, 2007)

  Similar sentiments are echoed in a TechRepublic blog:

  “I am glad my children don’t want to go into IT. They saw their old man get long-term laid off in 2002 and decided that was it.” (johnm23357 as quoted in Hiner, 2007)

This constellation of factors has produced a negative overall perception regarding the attractiveness of careers in IS.

Pre-Selection Guidance. This factor is cited frequently in conversations with IS unit heads as important in the selection of majors among entering undergraduate students. It would appear to be influenced by the same set of factors that affect the overall “Perceived Profession Attractiveness,” which directly influences the student themselves (albeit with some information lag and with different weightings than the student might give). For example, students already at a university may know better than their high school counselors that job availability and starting salaries have increased due to operative feedback loops between graduating students and students still pursuing coursework. Nevertheless, recommendations from trusted parents, counselors, and mentors weigh heavily on career choices and thus the selection of programs of study. As with “Perceived Profession Attractiveness,” this factor remains a negative influence on students selecting IS as an entry profession.

Curriculum Attractiveness to Students. This factor is a complex combination of other factors and is highly culture and gender dependent. Nevertheless, a few general remarks can be made, because this factor clearly plays a role in both the retention of students who have opted for a degree or focus in IS, as well as attracting non-IS students into IS course electives. First, compared to other disciplines, IS courses are seen as “hard” and often laden with professional
jargon. Second, students in industrialized countries appear to have developed an aversion for anything that sounds like programming. Third, the standard major in IS tends to have somewhat long, inflexible completion paths, unlike many competing programs that read something like “take four of the following eight courses.” Finally, the kinds of jobs students obtain upon graduation are unclear. Many appear to be programming jobs, not management-related positions. In part, curricula reflect the capabilities of the faculty. In this regard, many newly trained faculty, while well versed in strategic, organizational, and organizational psychology, have only superficial expertise in areas that currently have higher demand—for example, system integration, governance, service-oriented computing, project and contract management, management of globally distributed development, infrastructure management, and risk and security management. Moreover, many have almost no background in application areas such as supply chain management, business process management, and financial services. Not all new graduates are employed in IS strategic planning positions. Thus, we create courses and programs that are not attuned to current and future needs. They fail to attract student interest.

Factors Affecting the Existing Faculty Pool

With the rapid decline in IT-related student enrollments, S/F ratios (as previously noted) have declined markedly. At many universities, the decline was overlooked for a while, under the assumption that it was transitory. After five-plus years of S/F ratios in IS areas approaching one-third or one-fourth the norm elsewhere within the applicable college, school, or university, actions now have been and continue to be taken to redress imbalances.

Layoffs and Tenure. First among the actions taken was a layoff (or non-renewal) of “clinical” faculty (non-tenure track faculty). While some clinical faculty had only Masters or “ABDs,” others had PhDs but chose not to enter the tenure-track competition. In some cases, those laid off were able to find positions at teaching universities. This outcome, in turn, removed potential future demand from sources that, in prior years, had provided a temporary buffer for supply-demand imbalances. Once this buffer was exhausted, we next observed tenure-track faculty finding tenure difficult or impossible to obtain. As a result, they left to obtain employment in teaching-oriented schools or non-university positions. This phenomenon has now played out due to the length of time the student shortfalls have been in place and the typical five-year promotion-and-tenure cycle. Many IS academic units now have half or fewer faculty than they had at the beginning of this century. All that remains is to begin laying off tenured faculty. Where layoffs are contractually possible, they are often accompanied by the dissolution of the IS department (often in the form of a merger with other departments).

Inter- and Intra-University Transfers. During the boom time of the late 1990s, many rising and established “research stars” played “musical chairs” among schools that were seeking to bolster their research reputations. Other faculty also often moved from school to school for various reasons (e.g., reputation, teaching loads, salary, and personal reasons). The vacancies created by these transfers were often filled by new IS PhD graduates rather than those having the same seniority as those departing. Often the receiving institution created a senior IS position from special funding for endowed professorships. Thus, the transfer created a net gain on the demand side. Now, however, these types of transfers have reduced substantially. When they occur, the resulting faculty position at the departed unit is transferred to another unit with a much higher S/F ratio.

Intra-university transfers between departments have become increasingly popular, as IS faculty are asked, or volunteer, to change the nature and focus of their work (at least in terms of teaching). In some cases, the change is enforced through merging IS academic units with other units. The S/F ratio improves (assuming the merged department offers courses and programs that are more attractive to students). No new demand for graduating IS PhD students arises. Nonetheless, should an increase in IS students return, those units with S/F ratios closer to the norm are more likely to be the first to hire new IS PhDs.

Retirements. In North America, the existence of IS departments dates back to the late sixties or early seventies. Many are more recent, especially in non-North American industrialized economies. As such, demographics would seem to favor a wave of IS faculty retirements, beginning in the late 1990s and accelerating as the so-called baby-boomers reach retirement age. While this demographic effect lags by about five years in Europe, more-generous retirement plans also prevail there, encouraging earlier retirements than the once normal age of 65 in North America.

At some point, retirements of senior IS faculty should correct the S/F imbalance and begin to create position openings. Currently, this outcome has not occurred. The reasons are varied and differ by country. Nonetheless, they include:
IS academic units are comparatively new, relative to other units in their college or school and have fewer “baby boomers” than their counterparts in other, more traditional, units such as accounting and finance.

Many baby boomers are reluctant (or unable) to retire. Unlike younger faculty, they had no access to tax-sheltered retirement accounts, financial planners, deferred income plans, and the like until well into their middle or later working years.

The mainstays of baby boomers’ parents (in North America) were retirement plans that included employer-provided post-retirement medical benefits, Social Security, and the like. These have become compromised.

Life expectancy has increased significantly for baby-boomers. Many of the current generation of potential retirees, including academics, find they have to work beyond the normal retirement age.

Previously, post-retirees might have found an interesting position at a third-tier teaching institution to supplement retirement earnings. These positions have dried up for the reasons outlined above.

The net effect is that IS faculty retirements are unlikely to create a vacuum for new IS PhD students to fill. Even if some occur, at the moment it is simply an occasion to continue to redress the S/F ratio (and for IS departments to “lose a line” to their reporting school, college, or university).

Other Factors Affecting IS Faculty/Student Ratios

In light of our analyses above, in the short term the factors influencing IS program student demand are unlikely to produce substantial increases in student demand. Actions can (and should) be taken to improve student demand. Nonetheless, we believe that full restoration of the levels of demand inured to IS programs during the late 1990s (or the early 1980s) is unlikely to occur. Furthermore, current indications are that any increases over current numbers are likely to come quite slowly.

Two other significant factors on the student demand side, however, need to be considered: (a) required or mandated course(s) at the undergraduate and/or graduate levels where the demand is created (not by the attractiveness of IS courses per se, but rather by the overall demand for the school, college, or university requirements), and (b) diffusion of courses and topics traditionally taught by IS faculty into other disciplines.

Required IS Course Demand. The mainstay of student demand for many IS academic units has been required IS-related introductory courses at undergraduate and graduate levels. These typically guarantee IS academic units a large number of teaching sections. While rarely favored by IS faculty, they nevertheless have significantly contributed to the overall S/F ratio. In some cases they have masked steady declines in elective course enrollments. Unfortunately, mandatory postgraduate IS courses are coming under attack at many institutions. In MBA programs, such courses are no longer in vogue. Instead, more cross-disciplinary courses (such as supply chain management, ethics, international business, and innovation/entrepreneurship) must now be offered. The push for fewer required IS courses also arises because introductory IS courses receive low evaluations from postgraduate students. Similar remarks can be made about undergraduate required course(s) in IS. They too are under fire. Often they now represent a choice among “take three of the five.” Students then vote with their feet. The overall trend is clear—at both the undergraduate and postgraduate levels, required IS courses are diminishing in number (and credit hours).

Diffusion of IS/IT Into Other Disciplines. “Hot” topics today such as data mining, data warehousing, ERP applications such as SCM and CRM, business process analysis and improvement, knowledge management, and systems control and auditing have now moved to other disciplines. Previously, core knowledge about these topics “belonged” to the IS/IT domain. Now, non-IS faculty often teach these topics. These changes occurred while IS units were trying to “survive” the onslaught of student enrollments prior to 2001. Indeed, many IS units were relieved to see these topics picked up elsewhere. In other cases, faculty in these areas became sufficiently knowledgeable to allow them to teach IS/IT-related courses competently. Moreover, they brought the added dimension of contextual understanding and legitimization (e.g., marketing, accounting) and, in the case of business process analysis, concepts of six sigma and lean that originated in operations management. The result is that student enrollments that previously accrued to the IS academic unit have now moved elsewhere.

Finally, to summarize our expectations about the set of factors that impact student demand for IS/IT-related courses, we believe that few bright spots exist. Moreover, we believe this situation will persist for at least several more years.
Factors Affecting IS Faculty Demand

We now arrive at the point in the influence diagram where we consider overall IS faculty demand factors other than the internal S/F ratio issues discussed above.

Third-Tier University Accreditation. As university student populations continue to expand in many countries because of general population demographics, local or regional higher-education institutions (e.g., schools, technical colleges, and polytechs) are becoming larger and more diversified. They are taking on the characteristics of universities in their own right. Once they mature, they begin to seek additional accreditation to compete in broader markets and to diversify funding sources. Invariably, many of their faculty lack PhDs or academic publications, things that most accrediting organizations seek. Thus, an important new source of demand for published IS PhD faculty has materialized over the past several years. To date, some (much) of this demand has been met by prior generations of IS PhD oversupply as well as tenure- and non-tenure track faculty displaced from more-mature universities. In some countries, however, universities are well past the lay-off of non-tenured faculty. Thus, remaining demand for IS PhDs effectively is net new demand.

To date, we suspect that many of those taking positions in third-tier institutions have done so under duress. Relatively high teaching loads, lack of access to PhD and MSc thesis students, few research funds, and few like-minded faculty invariably affect their intended (and expected) research productivity. Those who survive these less-than-ideal circumstances and somehow succeed in publishing will likely be first in line for openings at research-oriented universities when they occur. Moreover, as with the proverbial bird-in-the-hand, those who have succeeded in publishing at these schools, in spite of these conditions, are likely to take precedence over just-graduated and comparatively unproven IS PhD students.

Research Rankings. At first glance, this factor may not seem relevant to a discussion of IS faculty demand. Many mid-tier research universities, however, find themselves in the odd position of having “top ranked” IS departments among other departments with mediocre rankings. High rankings, regardless of origin, have positive benefits for schools and colleges that have them and for the person in charge of these schools. As such, few heads of schools or deans are likely to throw the proverbial baby out with the bathwater when their IS departments have somehow achieved rankings that significantly best those of their peer units. The net consequence is often to switch the contributing faculty into positions that exempt them from teaching (e.g. running college doctoral programs or research centers) and/or providing internal or external titled professorships that carry much-reduced teaching loads. The effect is to reduce the overall full-time equivalent (FTE) faculty count in the S/F ratio.

Clearly, this factor is not major in terms of increasing demand for IS PhD’s overall. Nonetheless, it creates mobility among the “top 25” researchers in various regions and modestly reduces supply-demand imbalances. It also creates the illusion of position openings as some schools attempt to bolster their rankings by purchasing top researchers.

Effects and Remedies Related to Production-Demand of IS PhDs for Academe

Demand Factors and Effects

The preceding section has examined a number of the factors at play in the net reduction in overall demand for IS faculty in general and IS PhD students in particular. As noted, these outcomes are driven largely by a significant imbalance between normal S/F ratios and undesirable ratios in IS academic units. Most institutions are seeking to reduce IS faculty to restore appropriate S/F ratios. At the same time, many new IS PhD students enter the market each year. As a result, a significant and still-growing numbers gap exists between current demand and current supply. This gap has, and will continue to have, many side-effects. We outline some below.

The existence of a numbers gap in the IS field impacts current and would-be IS PhD students. Because traditional academic job opportunities decline as a result of the gap, they must revise their estimates of the benefits and costs associated with undertaking a PhD in the IS field. These revisions must take into account such matters as:

- The likelihood of reduced future income streams.
- Greater uncertainty surrounding future income streams.
- The need to attain higher levels of performance, such as publications before graduation as a PhD student, in order to increase job prospects upon graduation.
Higher search costs associated with obtaining a faculty position.

The possibility that no faculty position will be obtained, at least in the short run.

The possibility that an alternative career will have to be pursued because no suitable faculty position exists.

The need to attain yet higher levels of performance as a faculty member if a job is found to increase the chances of obtaining tenure, improved compensation levels, and other job opportunities.

Reduced expectations about job satisfaction levels obtained by working as an IS faculty member.

Higher personal costs associated with study-related and future job-related pressures and difficulties.

Existing IS faculty members face similar issues because of a numbers gap. For instance, the mean of the distribution of future income streams they are likely to receive will be lower, and the variance of this distribution will be higher. They will have to perform at higher levels to secure tenure, higher compensation, better job opportunities, and so on. For many, job satisfaction may decrease as a result of lower student numbers, commensurately fewer resources will be available to support research and teaching, and they will experience declining morale among colleagues. Higher personal costs will be associated with job-related pressures and difficulties.

The existence of a numbers gap also can lead to some “perverse” outcomes within the field in which it occurs—outcomes that ultimately are value-decreasing rather than value-increasing. For example, over-production of research may occur. In an effort to signal they are highly productive, students and faculty may engage in research activities that have little or no impact. An increasing number of low-quality conferences and journals may emerge (some would argue they already have) to provide publication venues for this research. In short, a numbers gap motivates a “numbers game”—one in which publication numbers take precedence over research quality and impact.

Similarly, as faculty positions come under increasing threat, faculty members may take actions aimed at preserving their jobs rather than maximizing the positions of the students and institutions they serve. For example, they may:

- Retain or initiate courses and/or units (subjects) that are not cost-effective (e.g., outdated or in low demand) but which rely upon their areas of expertise.

- Increase face-to-face contact hours with students in the hope they will be perceived as having reasonable teaching loads.

- Encourage more students to commence a PhD to increase their supervision loads.

- Take actions (perhaps subconsciously) to slow the completion rates of existing PhD students for a variety of reasons (e.g., postponing entry in hopes of a less crowded market, increasing the likelihood of more joint-authored publications, extending research funding support).

- Initiate new, low-value administrative work in the hope they can justify their positions based on service contributions they are making to their institution.

- Engage in (additional) administration, even when they lack the capabilities and experience to discharge their responsibilities well.

A numbers gap causes difficulties in the department or school in which the IS field subject to the gap is located. The most-immediate and most-apparent difficulties pertain to efforts to maintain financial viability. Often, the existence of a numbers gap in a field means that student numbers have fallen, S/F ratios have decreased, and as a result financial deficits have been incurred. Problems arise because of the inevitable cutbacks and restructuring that accompany efforts to restore financial viability— for example, behavioral problems associated with stagnant or reduced compensation levels and termination of staff perquisites (e.g., funding to support conference registration and travel, acquisition of new computers, personal digital assistants and cell phones, and course assistance support).

Less-immediate and less-apparent difficulties arise in the longer run that may have the most profound effects. For example, the department or school in which the field with the numbers-gap problem is located will be subjected to (at best) a hiring freeze. If the freeze extends over several years, the department or school may begin to stagnate. New faculty hires often motivate innovation and renewal, which are critical to the long-run survival and prosperity of the department or school. They underpin ongoing research productivity within the department or school and bring fresh research ideas, domains and methods. They also motivate curriculum changes that ensure the department or school’s courses and units (subjects) are up to date and relevant to the perceived needs of students and employers.
The problems that arise from hiring freezes on a department or school and possible stagnation may be compounded by reduced faculty turnover. With fewer job opportunities available while the numbers-gap problem remains, the tenure of existing faculty within the department or school is likely to increase. As faculty tenure increases, they may become even more locked in to the department or school in which they are located (and thus staff turnover in the department of school decreases still further). For instance, they become more established within their communities and thus for personal reasons are reluctant or unwilling to re-locate, or their productivity as a scholar may begin to decline and thus they have fewer job opportunities available to them. Indeed, in an over-supplied academic marketplace, only the most-productive scholars are likely to have job opportunities presented to them. If these scholars choose to leave a department or school, the difficulties associated with stagnation increase even further.

As already noted, a IS numbers gap also impacts other departments or schools related to the field in which the IS academic unit is located. The impact frequently takes the form of subsidies that peer academic units within schools or colleges must provide to the unit in which the affected field is located (to allow the affected field to survive). These subsidies divert resources from successful academic units. They thereby undermine support for students in these units. They also reduce the resources available in these units to compensate their faculty members, provide research and administrative support, and engage in service activities.

As a result, students and faculty members in related units begin to resent students and faculty members in the academic unit in which the field affected by the numbers gap is located. Morale problems begin to arise. Initially, they often take the form of derogatory comments about the affected field. If the problems escalate, however, they may take the form of aggressive opposition to the continued existence of the affected field. The institution’s leadership then must find ways to restore morale and to mitigate the problems that have arisen.

More generally, a sustained numbers gap signals that a marketplace is not operating efficiently. Where the supply of a product or service exceeds demand for the product or service, resources should be reassigned from provision of the product or service to provision of other products and services that have higher value to the economy in which the marketplace operates. A challenge we face within the IS field is to determine whether the current marketplace for IS PhD students operates inefficiently or the ongoing over-supply of IS PhD students reflects inefficient operations.

**Production Factors**

The production of PhD graduates cannot respond quickly to changes in demand patterns that impact student enrolments. For a start, a PhD takes three or more years to complete with the norm now approaching four to five years. When changes in demand patterns that impact student enrolments occur, a pipeline of PhD students is in place. Many, if not most, of these students are unlikely to withdraw from their PhD program because a downturn in demand for PhD graduates has occurred. Many have already invested heavily in their PhD studies and are reluctant to consider this investment as a sunk cost. They might also believe the downturn will be short-lived, or they might consider alternative careers, relative to an academic career, to be less attractive (even with high uncertainty about job prospects if they continue with their IS PhD studies).

Students who have not entered IS PhD programs, but have made a decision to undertake PhD studies, are unlikely to reverse their decision. Decisions to embark on a PhD usually are not made overnight. Given the high opportunity costs associated with undertaking a PhD (professional, financial, personal), individuals normally reach a decision only after an extended period of discernment (and often only after much consultation and negotiation with others). Significant commitments are then made—for instance, job resignations occur, relocation plans are made (often to another city and sometimes to another country), and children’s schooling is reorganized. Again, individuals who have made these commitments have strong incentives to maintain a belief that the downturn will be short-lived or that a job opportunity will arise at the conclusion of their PhD.

In the face of falling demand for PhD students, PhD-granting institutions may also be reluctant to wind back their PhD programs, to advise prospective students not to enroll, and to recommend that existing students terminate their PhD program. PhD programs are often regarded as the jewel in the crown of schools or departments or faculties. Furthermore, by providing inexpensive and willing manpower, often in the form of research technicians, they underpin much of the research activity conducted by faculty members. Moreover, they afford senior research faculty members an opportunity to teach courses that interest them most—namely, what they consider to be cutting-edge research topics and methods in their area of specialization.

The size of PhD programs and the subsequent achievements of PhD graduates also have a major impact on the reputation of the school or department or faculty. A high reputation, in turn, attracts high-quality students and high-
quality staff. It also affects the level of resources and compensation provided to faculty members, consulting opportunities that become available to some faculty members, job satisfaction and morale among faculty members, and the future career prospects of faculty members.

In short, relative to the demand side, the supply side is sticky. Quick-acting universities may cease faculty hiring, reduce or eliminate non-tenured faculty, and not grant tenure after a drop in student demand occurs for particular kinds of courses or programs. Supply-side stakeholders, however, are likely to react slowly. In the case of current or near-enrolling PhD students, long-term investments and hard-to-reverse commitments have been made. Thus, strong incentives exist to continue with their studies. In the case of IT-related faculty members, factors like power, compensation, and job satisfaction are at stake. They will be reluctant to wind back or to terminate their PhD programs. They will also be reluctant to advise students to leave or not to enter their PhD programs.

Some Solutions to the Demand-Supply Gap

As we have indicated above, the factors that underpin the demand for, and supply of, PhDs in the IS field and the way in which these factors interact with one another are complex. For this reason, the marketplace for PhDs in the IS field is rarely likely to be in equilirium. Either demand will exceed supply (a situation that existed for a lengthy period in the past), or supply will exceed demand (the situation that now exists and is likely to continue for some time into the future). Like any marketplace, however, the demand-supply gap is likely to decrease if actors in the marketplace are better informed, the marketplace is unconstrained (e.g., by government-imposed or self-imposed regulations), and a large number of responsive consumers and producers exist. In what follows we evaluate some ways in which the numbers gap might be reduced. We believe those most likely to be effective are founded on the notion that provision of better information will enable actors in the marketplace to make better local decisions. Better local decisions in turn will result in better global outcomes.

To begin, we see few, if any, short-term solutions to the numbers gap. We believe it is unlikely that the number of students wanting to undertake IT-related studies in the near future will increase rapidly. In this regard, student demand for IT-related studies seems somewhat impervious to demand for IT-related capabilities in the job market. For instance, in some countries (e.g., Australia) the IT-related job market has now been buoyant for several years. As previously noted, however, student attitudes toward IT-related courses and jobs remain negative. Moreover, those who have substantial influence on students’ views (e.g., parents and school counselors) retain a poor attitude toward IT-related courses and jobs. In Australia, federal and state governments and professional and industry associations have made substantial efforts to change the negative perceptions held by students about IT. In North America, similar efforts are now being made by some major companies (e.g., Microsoft, IBM) and some professional organizations (e.g., ACM). These efforts have had limited success. It is now clear that no easy solutions exist. It is also clear that changing students’ negative perceptions will require long-term, creative, diverse, and sustained efforts by many stakeholders. In short, one of the most significant factors affecting student enrollments, career attractiveness, remains negative and seems unlikely to change anytime soon. On the other hand, if efforts to change student perceptions are reduced or abandoned, the situation may only get worse.

An area where some success seems possible is the development of new programs that combine courses in IS with courses in other, more attractive disciplines. Areas that provide such potential are, for example, accounting and IS (particularly auditing), health services and IS (health informatics), IT and Financial Services, risk management and IS (security), infrastructure management, and business analysis (business process improvement and/or data mining and warehousing). For those departments still lucky enough to have a required undergraduate and/or graduate IS course, this presents a huge marketing opportunity, but only if the course content (not just the instructor) is seen to be exciting and worthy of further pursuit in elective courses or specializations.

One step beyond combining courses is combining disciplines. In principle, this path is taken in the creation of a number of the Information Science schools and colleges in North America (and the somewhat equivalent Institutes and Schools of Informatics in Europe and elsewhere). Some have succeeded in terms of maintaining or increasing student enrollments while IS department enrollments have declined precipitously. They provide a more-diversified portfolio of IS/IT-related courses and programs, from computer science to multi-media, to IS. Thus, they spread the risk associated with one particular area not being in high demand at a point in time. In addition, they have more freedom to respond to market changes, because they have a more-diverse base of faculty and research plus greater control over their curriculum. IS faculty members in these schools, however, often receive less compensation.
Artificial course-related demand also can be created. For instance, entrance requirements for IS students can be reduced (skimming the bottom so-to-speak). Another strategy is to offer online courses or entire online programs. In urban areas, in particular, convenience often trumps content. Whereas traditional classroom course offerings often have rather low enrollments, in places where traffic congestion reigns and students work/live off campus, the same course, offered online, fills to capacity. Moreover, because online courses involve increasing levels of technology, they play better to the hands of many IS faculty than their more technically challenged counterparts.

Given that few short-term solutions lie on the traditional academic demand side, the supply side perhaps should be the focus. Here several possible strategies exist to reduce the numbers gap. Unfortunately, all are likely to have limited effectiveness. Moreover, even if all were to be implemented, we suspect their total effect will still be minor, relative to the size of the problem. Nonetheless, supply-side factors appear to be more actionable in the short-term.

A first strategy is for universities to create incentives for IS academics to retire early. These incentives will have to fully address the issues previously given for why retirements are being postponed. If this strategy works, in principle it will create job openings for new PhD graduates, but only if the institution that adopts it is not presently over-staffed. Otherwise, the institution is unlikely to replace the retiree. Because many institutions currently have excess IS faculty, we suspect few positions will be created through institutions following this strategy. Rather, they will use the strategy to reduce IS faculty numbers.

A second strategy is for PhD-granting academic units to reduce their intake and production of new PhD students in the IS field. Unfortunately, they have few local incentives to initiate this action. Instead, some have incentives to increase PhD student numbers as a way of compensating for decreases in student numbers at the undergraduate and coursework postgraduate levels. If they limit their PhD student intake, they are focusing on the global “welfare” of the IS field at the cost of their local “welfare.” Perhaps some type of agreement can be negotiated among the major producers of PhD students in the IS field to limit new student intake. Such an agreement has the characteristics of a cartel, however. Thus, it will be unstable and unlikely to hold for any length of time. Once one institution breaks ranks and begins to increase its PhD student intake, others will quickly follow, if they are able. Moreover, the mechanisms available to enforce an agreement to limit PhD student intake among academic institutions are weak. They rely primarily on social censure of an offending institution.

A third strategy is to create postdoctoral research positions. This strategy would create a career path for PhDs in the IS field similar to the career paths pursued by PhDs in many science disciplines—namely, a period as a researcher before pursuing an academic career. Postdoctoral positions must be funded, however, and funding sources are not readily apparent. The IS field, save in parts of Europe, has little experience in establishing and operating the kinds of research programs in which postdoctoral researchers play an integral part. For instance, few academics within the IS field have the tacit and explicit knowledge needed to write the type of research proposals that would elicit funding to create postdoctoral opportunities for PhD graduates. Equally, funding agencies are unaccustomed to providing postdoctoral research support in the IS area. Many will likely balk at doing so.

In the long term, closing the numbers gap requires better estimation and understanding of student demand for courses and units (subjects) in the IS field. Given the time required for someone to obtain a PhD, student demand for IS education needs to be estimated several years in advance. Valid and reliable indicators of future demand need to be found. In Australia, for example, investments in IT infrastructure by business and government appear to be an important lead indicator of subsequent demand for IT labor. Historically, demand for IT labor in turn has been an important lead indicator of student demand for IT education. As discussed above, however, this latter relationship now appears to be problematic. Students continue to eschew IT jobs even in the presence of labor supply shortages and escalating compensation levels. Other factors, more qualitative in nature, now appear to play an important role in student choices about their education.

Even if student demand for IT-related courses and units can be estimated with some precision, supply-side factors also must be adjusted appropriately. The decisions that underpin appropriate adjustments are complex. Ideally, the supply of PhD graduates each year will just meet or be slightly below the combined hiring needs for IS PhDs. At a macro level, factors such as the likely future demand for IT labor, likely future demand for IT education, desired S/F ratios, PhD attrition rates, and PhD completion rates must be taken into account. Individual PhD-granting institutions must then estimate the number of PhD graduates that other PhD-granting institutions will produce. They will use these estimates to determine the number of PhD graduates they wish to produce themselves. In part, this decision will reflect conclusions they have reached about factors such as their own capabilities to produce PhD graduates, the type and mix of PhD students they produce, the likely demand for PhD education at their institution,
and their ability to compete effectively with other PhD-granting institutions. Clearly, balancing these sorts of factors is complex. Moreover, some factors are well beyond the control of individual institutions.

Non-Traditional Career Path Solutions for IS PhDs

As we have noted above, a complex set of factors influence the supply of and the academic demand for IS PhDs in industrialized economies. Many are systemic and beyond the direct control of institutional and individual decision makers. If we wish to continue producing PhD students in IS with reasonable job prospects, we contend that we need to explore alternative, non-traditional sources of demand. We believe these sources present an important opportunity to partially redress the overall IS PhD supply-demand imbalance, or numbers gap, provided IS PhD programs are re-oriented towards these sources. In the short and medium term, a significant (and for some, radical) shift would be required in the preparation of PhD candidates as well as the attitudes of PhD granting institutions and some prospective employers. Table 2 below summarizes two sources of non-traditional demand: demand for IS researchers by industry; and demand for IS academics in emerging economies such as India, China, and West and South-East Asia.

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<th>Table 2. Non-Traditional Sources of Demands for IS PhDs</th>
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We have not analyzed these potential sources of demand for IS PhDs using techniques such as the influence diagram developed in Figure 1 for academic placements. Moreover, the evidence available to support the claims we make below is mainly anecdotal. Nonetheless, we believe that these potential sources of demand present significant opportunities for placement of IS PhD graduates. In this light, we recommend to the academy that PhD granting IS academic units develop a more-balanced, portfolio approach to the selection, education, and placement of IS PhD students. We recommend a reduction in both the proportion and absolute numbers of PhD students selected and targeted for traditional, industrialized-economy research universities, and a re-balancing of throughput with PhD students targeted for one or both of the non-traditional demand sources outlined below.

Non-Academic “Industrial” Demand for IS PhDs in Developed Countries:

Most IS PhD programs in North America, many in the UK, some in continental Europe, as well as some in Singapore and Hong Kong, especially those located in second-tier research universities and business schools, evaluate their success by the placement of their doctoral graduates in peer or better academic institutions. On the other hand, a number of top-tier business schools and computer science (CS) and computer engineering (CE) programs routinely place a large number of their PhD students in industry. For example, while Stanford University places CS and CE graduates in R&D positions in Silicon Valley, MIT, Harvard, LBS, and INSEAD continue to place a fair proportion of their graduates in high-level consultancies and industrial firms. Significant numbers of PhD graduates from most engineering programs and science programs are regularly employed by major engineering, hi-tech, and bio-tech firms in the US, Europe, and Asia. Similarly, proportionately few PhDs in economics find employment with economics departments in universities. Some of the most coveted positions for economics PhDs exist with institutions such as the IMF, the World Bank, the Federal Reserve, United Nations agencies, local banks and insurance companies, and a variety of think-tanks and consultancies. In Europe, especially in Scandinavia, Germany, Switzerland, and the Netherlands, a long tradition of scholar-practitioners exists—PhD students who are trained in research methods but employed as executives and consultants in industry upon graduation. These
positions include industrial and business research positions, as well as high-level executive-practitioner positions that require thoughtful, reasoned perspectives on business and technology decisions.

**Non-traditional Demand.** Within the IS field, research firms such as Gartner and Forrester, major consultancies such as IBM Global services, Accenture, Booz Allen, and Ernst & Young, and product and IT service companies such as SAP, Microsoft, TCS, and Infosys often have large, dedicated research staff and research units that conduct and disseminate (often for large fees) leading-edge research to their clients and companies. For example, while the number of IS academics in the US is around 1400, Gartner alone employs approximately 700 research analysts and researchers, primarily in the US. Niche consulting companies such as McKinsey, Boston Consulting, A.D. Little, and Booz-Allen retain sizeable research staffs to support their consulting practices. Several leading-edge industrial research companies, consultancies, and product companies often set up their own research departments to conduct “thought leadership” research and into problems and issues that have a high level of relevance to business.

Ironically, a number of IS academic researchers quote findings from the research reports of these companies as evidence of the significance of their own research, or use the practices, products, and services developed by them as the subject of their research. Nonetheless, researchers, analysts, and developers who are seldom trained in the more-rigorous research methods that IS PhD students routinely employ often conduct the research in these companies. Given the large variety of relevant, researchable problems that have emerged from the chaotic business environment, the transitions from industrial- to knowledge-intensive work and product- to service-market orientations, and the ICT-enabled move from co-located to globally distributed work, organizations have a large, unmet appetite for rigorously researched business knowledge, analysis, and solutions.

**Meeting Non-Traditional Demand.** To the extent we have chosen for ourselves and our PhD students the well-defined, esoteric problems favored by the premier journals in our field over the messy, emergent problems of the real world, we have distanced ourselves and our PhD students from this comparatively large and highly profitable market for researchers. Currently, the typical IS PhD student has not been trained to appreciate, understand, research, and solve real-world business problems. Their mind-set is often reductionist, focusing on narrow problems, which in the context of business problems are too minuscule and insignificant, or too removed from reality, to be of any use to practice. Furthermore, instead of recognizing that we can learn from the accumulated trial-and-error wisdom of business practice, we often take an arrogant view. We believe in the superiority of our research and research methods training. Moreover, we assume that as “creators” of knowledge, we only need to take the “gospel” to ignorant inhabitants in the business world. We produce journals to educate these inhabitants and then wonder why they do not come to us in search of more knowledge of this type. We are in an incestuous knowledge cycle. We teach our PhD students to define problems in terms of “gaps” in the literature, not real-world problems. We train them to believe that the only lenses they can bring to bear are those derived from previously published premier journal articles. Like high priests and grand ayatollahs training acolytes in liturgy in monasteries or madrasahs, we train too many of our PhD students in the ritual of research methods. We do not develop their abilities to (a) reflect and question the shortcomings and appropriateness of these methods and theories for the purpose at hand, and (b) abstract the underlying problem from the narrow context presented to a broader and more interesting generalization. Von Hayek, in his acceptance speech for his Nobel Prize in Economics, calls this practice of academe, the “pretense of knowledge” (Von Hayek (1974).; Ghoshal (2005) echoes similar views). Changing the mindset of those who produce IS PhD graduates from that of a person indoctrinated in the “pretense of knowledge” to a person who is capable of understanding and creating actionable knowledge will not be easy.

Fortunately, numerous examples exist within our field where a balance has been struck between rigor and relevance in the education and placement of PhD students. For example, IS PhD students in Scandinavia, The Netherlands, and Switzerland often work directly with companies on problems these companies face. In some cases, these students are employed by the company and given the time off to work on and complete their PhD studies before returning to the company. In others, students are supported in whole or in part by a grant from the sponsoring company. In still others, the government provides financial support, either during the course of studies or upon graduation. While a gamut of research methods is used, typically methods such as action research or design-science approaches are favored. In addition to the thesis, the student generally co-authors one or more scientific papers targeted at academic conferences and journals that are more attuned to both these types of research methods.

**Problems of Transition.** To move from a program whose primary or sole intent is to produce IS PhD students for placement and tenure at peer-or-better research universities to one whose objective is to create a portfolio of both research academics and industrial placements requires a number of actions on the part of the IS academic unit, its college or university, and the industrial marketplace for such graduates.
As noted, some faculty are ill-suited by disposition and focus to attacking problems that arise and are framed in industrial contexts and/or preparing and mentoring PhD students to contribute to their solution. They are, by degree, successful in preparing PhD students for classical placements in academe and publication in premier journals. Thus, other faculty must be found who are both interested and capable in undertaking such supervision. Similarly, the typical schedule of coursework confronting a PhD student needs to be re-balanced. Time needs to be given for company interactions as a form of field (versus class) learning. As well, in-class courses have to be partially different in their scope and content, favoring alternative research methods, investigatory work over journal paper critique and writing, advanced knowledge in IS practice, and directed readings courses that favor reflection and abstraction. Overall, more flexibility will be needed than the typical, highly regimented course sequencing and checklists mandated if not favored in many North American university programs.

At the school/college level and perhaps university level, changes must be sought and approved to allow greater flexibility in the curriculum. As well, issues of intellectual property may arise if new ideas, with commercial potential, are created by the interaction between the sponsoring company, the PhD student, and his/her mentor. Perhaps the most significant change for many schools will be accepting and supporting the production of PhD students targeted towards industry rather than peer-or-better academic institutions. At the dean or head-of-unit level, the incentives for making such a transition would likely include developing improved relationships with companies, the ability to fund portions of the PhD program from outside sources, opportunity to innovate curricula, and the ability to maintain a PhD program and the research outcomes it produces in a down-demand market (rather than reducing or moth-balling it with consequent effects on research productivity and morale). Pointing to successful examples elsewhere, including top-tier business schools and programs in other parts of their own university might also help.

Finally, considerable work will be needed to initiate these kinds of collaborations between industry and the program. In many cases, industry placements of the kinds previously discussed are unknown in countries like North America and Australia. Questions that might be asked by industry of academe in this regard include: Can we be trusted to do this? Do we have successful examples we can point to? How will this work? What do I (the company) get from it? What does the “contract” look like? Finding opportunities, matching them up with internal capabilities, and timing the match with student interest and availability all require considerable work by a number of faculty and administrators. Financial arrangements also must be worked out in advance—where the money goes and who gets it.

To summarize, while many obstacles have to be overcome, others have already done so. Successful variants of the portfolio approach to IS PhD production exist and can be studied. Were such a transition to take place among a majority of the current “for academe-only” PhD programs, we believe substantial progress would be made towards bringing supply back into alignment with demand for IS academics. At the same time, the size of IS PhD programs would be maintained and even might increase. The IS field’s contributions to industry would also be increased.

**Academic Demand for IS PhDs from Emerging Economies:**

**Demand-Side Opportunities and Impediments.** Another, immediate source of demand for IS PhDs are new business schools that have been and continue to be created in the emerging economies of Asia, especially India and China, but also in South-East Asia and West Asia. Compared to North America and Western Europe, business education and the resulting professional managers are a relatively recent phenomenon in these countries. As India and China grow into some of the world’s largest economies, the need for MBAs, trained business professionals, and business schools is exploding. Furthermore, in India, and to a lesser extent in China, the exponentially growing demand for offshore outsourcing of IT services and IT-enabled services, and the consequent growth in the job-markets and salaries, has increased the derived demand for IS and IT education. Predictably, a severe shortage of business and IS PhDs currently exists in these countries.

Increasing numbers of Chinese and Indian students are seeking doctorates in business-related disciplines, including IS/IT, in North American, European, and Australian business schools. As such, existing market dynamics are addressing demand for IS faculty in these emerging economies. Nonetheless, two factors mitigate against the market for PhDs in emerging economies clearing. First, because of the relatively lower salaries paid to academics in these countries, students from them compete and secure positions in the now over-crowded developed-economy academic markets. In emerging countries, a fresh MBA or an IS/IT services professional often commands much higher compensation than a senior professor. Thus, it is difficult to repatriate a person completing a PhD from a relatively wealthier country to teach in her or his home country. The problem is further compounded by the training and socialization in the “research culture” and research topics that a “developed-economy trained” doctoral student would be maintained and even might increase. The IS field’s contributions to industry would also be increased.

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receives. Often, they have minimal or no understanding of typical problems facing a business executive in their own country. Moreover, their training often focuses on research approaches, methods, and theories that have little relevance in the business context of their own country (or even the academic journals favored there). As such, the typical graduate of a developed-country PhD program is often at a severe disadvantage in either teaching aspiring IS/IT and business practitioners and/or conducting research into problems and issues that are pressing in their own country. Some top-tier schools such as MIT, Harvard, Cambridge, and the London School of Economics, have recognized these problems. They are creating specialized research programs and degrees aimed directly at emerging-country markets. Such programs are few and far between, however, and they are currently in their infancy.

Possible Solutions. The first problem is how to create a full-cycle flow of IS PhDs trained outside the home country from and back to that country. Visa restrictions in some countries directly or indirectly deal with this matter. For those regions where government policy doesn’t de facto or de jure preclude seeking work in that country, other approaches are needed.

One, perhaps controversial, way of matching the over-supply of western-trained Indian and Chinese PhDs with the unmet-demand in their countries is to implement a bond. If PhD education is either subsidized or financed by the student’s home country or degree-granting institution, students would be required to sign an agreement that required them to return to work in their home country. The agreement might cover a fixed period of three or four years; if not honored, a refund, with interest, on the full amount of the subsidy might be required. Such arrangements were at one time common in Singapore. The Singaporean government funded the doctoral studies of their nationals in western universities on the condition that they returned and served their country for a certain number of years. A similar program existed for Canadian university faculty and students. To effect such a solution, a bi-lateral agreement would be established between two universities, one in the emerging country and one in the emerged country. Alternatively, agreements could be executed at a higher regional or national governmental level. Such agreements already exist between some academic institutions, even in relation to IS PhD programs. Again, these can become models for others, because most reputable universities and business schools now have one or more “sister” universities in the emerging-economy countries. Such agreements have a dual benefit. First, the PhD supply-demand imbalance in emerging-economy countries would decrease. Second, by removing IS PhD graduates from the PhD market in developed economies, the demand-supply imbalance in these economies would decrease.

Perhaps a more-difficult problem to overcome is the necessity to adapt the orientation, content, and focus of the IS PhD program delivered to the needs of the receiving country. The problems are similar (but not identical) to the programmatic problems associated with accommodating PhD students targeted for industrial employment. Here again, this is not virgin territory; other programs have met and overcome these obstacles. For example, to provide a more-tailored context, faculty from the home country can take sabbaticals at the host university (where these stays are generally funded by the sending government). They can work with faculty in the host institution faculty and the PhD students themselves. Moreover, in many regions, companies based in the emerging economy of interest may well have branch operations near the hosting university. This may provide both relevant research problems as well as sources of additional funding support for the arriving PhD student and/or the hosting institution.

Industrial Demand for IS PhDs from Emerging Economies:

Demand-Side Opportunities and Obstacles. As the emerging economies of India and China grow, they are generating considerable internal demand for applied research. There are at least two sources of demand. First, research on regional businesses, markets, and conditions is needed. Second, offshore-outsourced research services by companies and institutions in the emerged economies are needed. For example PRTM, a niche consulting company undertaking research and consultancy in the area of R&D and innovation, is currently creating a global expertise and knowledge-sourcing center in India. Similarly Google recently defined the position of a Chief Globalization Officer (CGO) and located it in Bangalure. Philips Software has built a major R&D campus in Bangalore and is currently in the process of building another near Shanghai. Both Microsoft and Intel are setting up major R&D centers in China and India.

These two factors have led to explosive growth in internal markets and the offshore insourcing of applied research from developed countries. Moreover, they have created a rapidly growing and unmet market demand for applied researchers in China and India. They have also led to increased compensation in these countries. As a result, we already see the beginnings of a return of the Indian and Chinese Diaspora to their native land.
Nonetheless, in the case of IS/IT, the lack of an appropriate mindset, research practices, and appreciation for local problems reduces the local employability of many western-trained PhDs returning to their own country. By indoctrinating the best brains from these countries in the current culture and rituals of traditional, academic IS research, we have reduced their ability to address the issues and problems they face in their own countries.

Possible Solutions. In brief, the solutions appear to be a combination of those proposed above for producing industrial research IS PhD students and those proposed for developing an appropriate research context—namely, bilateral agreements with prospective employers of students and residency periods for both faculty and existing industrial PhD’s from the originating economy and company (to provide context and problem sourcing that could originate from the cooperating partner’s operations based in the host country). Again, such types of relationships presently exist, albeit not for this explicit purpose. For example, WiPro has just established a work and research center in the State of Georgia, in collaboration with the Georgia University Board or Regents. What is suggested above could be a logical next step in such a partnering arrangement. Similarly, many Chinese-based companies now have R&D centers based in North America and elsewhere. In many cases, they are seeking to develop, and then by exchange, import “process competence” that includes substantial amounts of ICT-enablement back to the base locations and operations.

Summary, Conclusions, and Future Actions

To summarize, we have attempted to dissect, in detail, the reasons for the current lack of IS PhD student demand—namely, the decline in demand for elective IS-related courses and the diminishing number of required IS courses (that historically have created IS course demand that is impervious to student’s inherent interest in the subject). We have described the nature of these underlying factors and examined the likelihood that they will change to substantially increase course demand and eventually new faculty hiring in IS. While some indicators that initially led to the decline are now trending upwards (e.g. industry demand), we have concluded that a more difficult problem has taken root over the past few years—namely, the unfavorable attitude of prospective students towards a career in IS. We have tried to explicate a number of the underlying factors contributing to this attitude. Moreover, we have concluded that affecting significant change to this attitude will be difficult, at least in the short run. While in some cases, job opportunity trumps career efficacy, particularly in down employment markets, this situation is presently not the case in many parts of the world (i.e., a buoyant market exists for graduating business students). The current view of many IS/IT professionals is that jobs in this area follow the pattern of “last to hire, first to fire” (or outsource). If this view is true, we are not likely to see demand fueled by IS/IT.

We next examined other potential sources of student demand for IS courses. Here, too, the signs are not positive. For example, courses that IS faculty have typically taught in the past, such as data mining and warehousing, systems auditing, and business process analysis are being taken over by other disciplines, thereby further reducing demand for IS courses and faculty. The growing overall student population due to the demographics in many developed economies has created new universities and the need to staff these with PhD qualified, research-active faculty (in order to acquire various certifications). Nonetheless, these positions have been backfilled, to a large extent, by IS faculty laid off from their previous institutions and several years of IS PhD over-production.

Another factor fueling demand is the current availability of IS/IT faculty. Here, too, we looked at what might be positive signals in the sense of a diminishing supply to cover what student demand exists. We concluded that factors such as baby-boomer retirements are not happening in sufficient numbers to make a significant dent in the current situation. We also examined problems with S/F ratios that now exist in many IS academic units. Declines in IS elective course and program enrollments have been as high as sixty to eighty percent. Nonetheless, the combination of lay-offs, non-tenuring, and transfer of faculty has, at best, reduced remaining faculty by fifty percent. For many IS units, therefore, a substantial disparity still exists between their S/F ratios and those of peer academic units. Until the ratios have parity, ways to further reduce existing faculty will be sought. This represents a further impediment to new faculty hiring (i.e., even if student numbers go up, it will still be some time before new hiring occurs). Many academic institutions are not waiting for this outcome to happen. Instead, they are taking more draconian measures, such as force-merging departments or eliminating them and their tenured faculty.

Against this backdrop, we urge introspection about how and why we are producing IS PhDs. While we considered some manner of agreed reduction across all IS PhD programs, ala OPEC, we do not believe this outcome will happen, nor that it is sustainable. Instead, we offer some alternative sources of IS PhD student demand that could re-invigorate our PhD programs, produce desired outcomes, provide students to support faculty research and publication agendas, and perhaps even enhance the reputation of the IS unit within the college. Specifically, we
examined three such sources of untargeted and unmet demand: industrial/applied research, emerging economy IS faculty, and emerging economy industrial/applied research. We canvassed the nature of the demand, current impediments to meeting this demand, and some solutions to overcoming these impediments.

In our analyses, we have intentionally sacrificed depth for breadth. We believe the scope of the underlying problem involves a number of factors that interact in complex ways. To focus on one or two would miss the overall point and enable local rationalization (and inaction) of the types we have observed so far. We accept, \textit{a priori}, that the tone and conclusions reached may not be well received by many colleagues. In this regard, our conclusions and recommendations challenge the \textit{status quo} and perhaps the power base of many senior scholars (those who have optimized their career to produce the types of curricula, research, and PhD students that we now question). We are not suggesting such programs, students, and curricula be abandoned. Instead, we suggest the adoption of a more-balanced portfolio approach to IS PhD production. We encourage the academy to actively debate, offer additional suggestions, and document successes related to the approaches we have outlined. Visitation committees might also be formed to assist those IS PhD programs that would like to adopt some of our recommendations.

Finally, the constellation of factors introduced in the first sections and their influence on the underlying demand for IS courses and faculty need to be examined with greater rigor, using readily available tools and methods from our own and other disciplines. This should be a joint undertaking by our academy, involving many IS academic units across regions and countries. Only then can we better understand the nature and scale of the problem that lies before us and what actions can be taken to remedy the underlying student demand problem.

\textbf{References}

Ghoshal, S. “Bad Management Theories are Destroying Good Management Practices,” \textit{Academy of Management Learning and Education} (4:1), 2005, pp. 75-91


