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SUCCESS FACTORS FOR INDUSTRY-UNIVERSITY COLLABORATION THROUGH IS INDUSTRY BOARDS: A MEXICAN CASE STUDY

Carlos J. Navarrete and James B. Pick
University of Redlands, 1200 East Colton Avenue, Redlands California 92373-0999, USA
E-mail: (navarret, pick)@uor.edu

ABSTRACT

This paper examines how to promote industry-university collaboration through industry boards. Based on a case study of the Information Systems (IS) industry board of a private university in Mexico City, the paper presents why industry collaboration is important for IS academic programs, and how this collaboration can be reached through an industry board. The paper gives insights on how to form, operate, and evaluate an industry board. Then, it presents how this function was carried out at a private university, showing the impact of the board on the academic performance and IS programs. Two research questions address the critical success factors for an industry board and whether an industry board differs between developing and advanced nations. The results identify the critical success factors for industry boards and point to three areas that distinguish boards in developing versus advanced nations. Lastly, the paper concludes with a set of recommendations to enhance IS programs through industry advisory boards.

I. INTRODUCTION

This paper examines the role of the IS industry board in industry-academic interaction in IS programs. Because IS academic programs concern fast moving aspects of technology, it is critical for the quality and even viability of these programs that they keep up to date with current technology and industry practices. For instance, IS programs today that fail to recognize the dynamic changes in the internet and e-business run the risk of becoming albatrosses that do not have credibility in industry.

There are many forms of interaction between academia and industry, including corporate boards, student internships, faculty internships, corporate grants, speaker series, partnership courses, and curriculum revisions committees (Schenk and Pick, 1998), website corporate partnerships (Kock et al., 2000), work contracts for IS students in industry (McGowan and Cornwell, 2000), and others. This paper focuses solely on industry advisory boards to IS programs. The industry advisory board is widely utilized by IS programs. It is defined as a group of IS faculty, industry representatives, and others, with the goals of improving academic programs and industry knowledge and performance. It meets regularly to discuss issues in curriculum, research funding, internship opportunities, industry trends, job markets for program graduates, and other relevant topics at the interface between the IS academic program and IS industry practitioners. Although many benefits have been reported from such IS industry boards, problems and concerns have also occurred. This paper will explore pluses and minuses of the IS industry boards in practice and suggest ways to foster more successful boards.

This paper is based on an in-depth case study of industry-academic collaboration located in a developing nation, Mexico. All of the prior literature of case studies on collaboration of IS programs and industry were from advanced nations (Gasen and Banks, 1993; Richmond, Crow and Lampe, 1994; Kock, Auspitz, and King, 2000; Schenk and Pick, 1999), although one research project presented several case studies on more generic, non-IS collaborations between industry and academic in developing nations (Oblinger, 1993). However, the purpose of this paper is to provide more balance in the research literature by analyzing in depth a case study of an IS-discipline-based industry board from a developing nation, Mexico. Then the findings for a developing nation can be compared with the large body of findings existing in the literature for advanced nations, mostly in the U.S. Distinctive features, operational parameters, and success factors of IS industry boards for a developing nation can be identified and explained.

The paper's research questions are as follows:

1. What are the critical success factors for achieving good outcomes with an IS industry board in a developing nation? What factors impede the achievement of good outcomes with such a board in a developing nation?
2. Based on the results for 1. and on literature studies for advanced nations, what factors are distinctive and serve to differentiate IS industry boards in developing nations from those in advanced nations?

The methodology is the case study (Yin, 1994). Case study analysis is commonly utilized in IS research, including in-depth cases as in the present research. The present case was documented through detailed record keeping and tracking for a period of five years by one of the authors

This research is exploratory, since there is only one in-depth case that is examined. The paper calls at its end for additional case studies in order to test the results with a robust sample of cases. Nevertheless, this paper provides an initial contribution to understanding the IS industry board as a key factor for the success of IS programs in a developing nation.

II. BACKGROUND

The need for industry-academic ties stems from the locus in industry of research, products, technologies, real world advice, and ideas that are valuable to universities. Conversely, universities can provide basic and applied R&D, academic ideas and knowledge, new workforce i.e. student graduates, and faculty consulting advice.

The recent changes in the focus of universities points towards universities with more market and customer orientation, greater flexibility of delivery, and more emphasis on performance (Oblinger, 1993). Although these changes have made inroads only at certain institutions, the general trend is in this direction. As universities come to resemble somewhat more industry, greater ties may be possible.

There is a limited body of prior case studies of industry-academic linkages. Rather than review exhaustively, several stud-

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ies are referred to. Parker (1993) presented a broad study of industry-academic partnerships in both advanced and developing nations, but ones not involving the IS discipline. Parker sees the underlying driver leading to growth in ties as universities' need for revenue enhancement. However, Parker cautions that some of the most financially successful cases of industry-academic linkages had the focus on collaboration, not on revenue generation. When the focus was centered on revenue generation, often results were poor.

The study looked at four different models of industry-academic partnering in Turkey, the UK, Slovenia, and South Korea. In the cases of Turkey and the UK, a displaced emphasis on revenue led to disappointments, while in Slovenia and South Korea, the collaboration was built first and the overall outcomes were highly successful, without impeding academic freedom or educational quality. Parker points to the following factors as encouraging success in ties: collaboration incentives, work on partnership building, care in project selection, institutional factors, and the positive role of proximity.

Among the barriers to success are lack of translation into application and research deficits in developing nations. There are many instances when linkage or ties are established, only to falter before being translated into positive applications. Parker ascribes the reason for this to lack of correct skills and foresight by both academics and corporate participants. The second barrier relates to differences in R&D in industry in developing nations. For instance, Parker mentions Mexico specifically as having industries, for which little R&D is being conducted. Instead, the industries depend on import of technology and innovations, often relying on the parent companies. This points to the need to understand the differences in the exchange model for developing nations.

Several studies delineate models and cases of university-IS academic partnerships (Schenk and Pick, 1998; Maehl, 2000; Kock, Auspitz, and King, 2000). One research framework for these partnerships consists of a two dimensional grid of exchange with one dimension being the amount of resources available for the exchange and the second the comprehensiveness of activities (Schenk and Pick, 1998). Arrayed along this grid are exchanges that vary between one small advisory committee and very little resources up to elaborate set-ups with IT research center, industry workshops, extensive research internships, and large scale industry grant funding. The paper points to the need to match comprehensive of activities with the appropriate size of resources. The paper includes four case studies of university-industry exchanges, located at different points on the grid. The most common form of exchange for all the cases was industry-IT program board or advisory group. One of the cases involving success with industry boards was University of Redlands (Schenk and Pick, 1998; Maehl, 2000). Among the success factors for this case were clear mission given to the industry board, careful choice of members, and clear objectives for meetings and follow-through for action items. For the larger sized case, UCLA, the industry board was the original locus of exchange, from which much more was developed over time.

Industry-IT program partnerships today can involve the new Internet technologies. For instance at Temple University, a course was designed for industry experts to interact with students, and the locus of exchange was a website with rich course materials and student products (Kock, Auspitz, and King, 2000). This was highly successful partly because of the convenience factor for busy industry personnel and because it appealed to technologically savvy IS majors.

In summary, today's more complex industry and university environments give ample opportunity for many types of positive exchanges. At the same time, barriers and obstacles may prevent successful outcomes. The relatively scarce literature on developing nations (and none for IS programs) indicates that the model may change in certain ways for exchanges in the context of those countries. The wide variety of types of exchange set-ups for IS programs in the U.S. can be understood better by considering exchange along a two dimensional grid of comprehensiveness and resource amount. Finally, the industry board has been a mainstay form of exchange for a variety of universities and regions

III. IS INDUSTRY BOARDS

An IS industry board is a committee composed by ten to twelve members, with strong IS experience and relevant industry participation. These committee members in some way are interested in the IS/IT university programs, university development, and university-community enhancement relationships. Several reasons explain why it is not recommended have more than twelve, nor less than 10 members in the board. (1) Since member participation, is honorific the board should not be too big. Additionally, managing meetings with more than twelve participants become inefficient. (2) The advising opportunities grow with the number of members, so you may want to have as many members as you can properly involve in the board's agenda. (3) A smaller number of members reduce board effectiveness, if the members cannot attend or keep working on the board. (4) It is recommended to have as many constituencies represented as possible at the board.

According with the prevailing situation of the IS/IT program(s) and the purpose of the future industry-university relationship, the University (chair and dean) should select the industry sector they want emphasized on the board, and then set a list of candidates from that sector. Then the IS program proposes and invites those candidates with strong experience and relevant industry participation. It is important that the honorary invitation to become a member of the board is given to the individual in a personal capacity, not to him/her acting as president or director of a given organization.

Once the board is constituted, a two-fold evaluation should be designed.

First, the evaluation of the board should be directed to board activities, inhered projects, and advising follow up. And second, the University should prepare the evaluation of the impact of the board on the academic programs, the department, and the university. The board 's impact should be based on the purpose of the board and its agenda.

IV. THE IS PROGRAM AND ITS IS INDUSTRY BOARD.

This paper is based on a case of a private university in Mexico City. The University has 10,000 undergraduate students, and 1000 graduate students. The University lost its campus to an earthquake in 1979. The building of a new campus in another location in Mexico City unfortunately hurt the academic development plans of the University. The IS Department and its academic programs (undergraduate, graduate, and departmental service) struggled during the early 1980s. By 1987 the IS Department situation was characterized by: lack of proper IS laboratories, few faculty members, faculty without strong academic or industry careers, stagnant student enrollment, and lack of IS leadership within the University.

In 1987 the University's authorities decided to promote an IS industry board to enhance IS programs. The University's President personally invited the future board members (Table 1).

Table 1 - IS/IT Industry Board Members (1988)

Board Member	Affiliation	Industry sector
Alfredo Capote	IBM of Mexico (Marketing Director)	Hardware and Software vendor
Manuel Diaz	HP of Mexico and Latinamerica (President)	Hardware vendor
Arturo de la Torre	Planning and Control Director	Mexican Government
Fernando Espinosa	Transport Ministry	Mexican Government
Antonio Fajer	Informatica Timon (President)	IS/IT Consultant
Sergio Ferraguth	Cullinet Mexico (President)	Software Vendor
Carlos Gonzalez	NCR de Mexico (President)	Hardware and Software vendor
Luis Gutierrez	DEC of Mexico (President)	Hardware and Software vendor
Antonio Galaz	Grupo Cifra (CIO)	Retail
Gillermo Levine	Universidad Autonoma Metropolitana (Research Director)	Education

The IS industry board meet two times a year, with monthly updates. That is to say, the chair of the department wrote and distributed a progress report among the board members once a month. The chair also met separately with one or two members if a given project asked for such a close supervision. After every board meeting, the board had lunch or dinner with the University's Principal and top management members, during which a summary of the meeting and future actions were outlined to the University top management.

The membership service was set for three years. However, after four years of operation five members were rotated mainly because of residence changes.

The role of the IS/IT university board went far beyond everybody expectations. In fact, the IS department could not take advantage of all the opportunities that the board brought to the department and to the IS programs. Every year, the results were more encouraging, and positive results led to more challenging projects.

V. IMPACT OF THE IS/IT BOARD ON IS PROGRAMS.

Among the positive impacts of the IS industry board on IS Department performance were to help in enhancing the program's curricula, the university computer labs, student internship programs, faculty training, and industry base projects (see Table 2). The IS students benefited from the new undergraduate and graduate curricula. The IS board sanctioned the content and curricula orientation. In the case of the new graduate program, it was presented to CONACYT –the science and technology support government entity in Mexico—, which evaluated and promoted it to the excellence program roster. Any student accepted in a program included in this roster got a scholarship from the Mexican government. Thanks to the IS board, also, the undergraduate and graduate students had access to up to 60 internship positions annually. Some of the students (up to 20 per year) particiapated in industry projects that were led by IS faculty members.

In the case of the faculty, they benefited from the IS/IT Board through software training programs such as C language, Unix, DB2, operating systems, and through taking part in industry consulting projects (see Table 3). Base on this training and participation, the IS faculty increased their income by an averageed 40 percent in average. Lastly, the impact of the board at the university level was important. First, the board allowed the University to increase the competitiveness of its academic programs. Second, thanks to the board too, the University enhanced its computer labs, investing about 30% percent of the market value of the labs. Third, the University increased its own revenue without financial cost.

However, the lack of industry-university collaboration slowed down the IS Department performance from 1992 to 1996 (Table 2). Changes in the University's administration and in the Department Chairmanship led to misunderstanding of the IS industry board contribution; the Chair ceased working with it and it died.

By 1996 the undergraduate IS curricula was not updated, losing its appeal for new students. The demand for the program decreased, and the program population decreased to 310 students from 610. In the case of the IS graduate program there was a new curriculum that failed CONACyT certification. By 1994 the program was excluded from CONACyT's excellence roster. Slowly, the IS Department lost IS/IT leadership within the University. Lastly, the IS Department faculty body lowered to 8 full-time professors, who stopped taking part in any industry related projects.

Table 2. - IS/IT Board Impact on IS Department and its Academic Programs.

PARAMETER	With IS Board (1988-1992)	Without IS Board (1992-1996)
Undergraduate Student population.	Grew from 260 in 1987 to 610 by 1992	Lowered from 610 to 310
Graduate Student Population	Grew from 40 in 1987 to 82 in 1992	Lowered from 82 in 1992 to 12 in 1996
Graduate Program Quality	Certified by CONACyT, and part of the excellence roster.	Dropped from CONACyT's excellence roster
University Service	1700 student-course, 200 part time professors In charge of the academic computing service	800 student-course 60 part time professors
Computer labs	Grew from 40 screens to 450 screens	Grew from 450 to 1200 screens, but IS department controls only 400 screens
IS faculty	Grew from 6 to 13	Reduced 13 to 8
IS faculty salary	40 % above the University's regular salary	Universities regular salary.
Projects with industry	Several (see table 3)	None
Students Internship	Regular program with 60 positions per year	No longer a regular program. No more than 10 positions a year.

Table 3 - Examples of IS/IT Projects Promoted by the IS/IT Industry Board

Project	Description
Computer Literacy Program	Course design and training program for 800 Hewlett Packard Personnel.
IS Security Executive Program	Executive program for IS banking personnel.
IS network security program	IS security network procedures and policy design and implementation for International bank.
Telmex quality suppliers control information system	Information system to control, register, and monitoring suppliers.
Systems Audit	Audit of Information Systems of INCOREC.
Assets control Information System	Information System that allowed Procter and Gamble to monitor and quantify companies assets.

VI. FINDINGS OF THE EXPERIENCE

There are several concerns regarding industry-university collaboration. These concerns inhibit university attempts to take part or promote industry programs. First, the university may lose academic control of its programs. If you invite software or hardware vendors to take part on university committees, you end up buying their products. High caliber industry member do not want or cannot participate in University related activities. It is costly to have an industry board. When faculty takes part on industry projects, they end up either quitting his or her faculty position or behaving as a part time professor with an office at the university. You only can have industry related programs if you have a huge faculty body. Professors do not want to take part on industry projects. The university needs a bigger budget to support projects recommended by the IS/IT board. And if a project fail, the university social recognition or reputation is destroyed.

From the industry standpoint, even though there is a posi-

tive attitude toward industry-university collaboration, examples of this collaboration are scarce in Mexico. Specifically, the case of industry projects developed by faculty and students has a mixed outcome. On the one side, industry was willing to contract the university's service, but at a lower price than what would be paid for the same project to a consulting firm. If the university accepts this condition, then the university will receive the criticism of consulting firms. These firms argue that a university can take some projects having the economic benefits, but without having the cost that other organizations have such as rent, hardware, software, and staff cost.

However, the IS programs' experience at the University shows that properly managed all these concerns can be avoided or minimized. For example, in particular, the IS department never lost the control of the academic programs. On the contrary, the Department curricula became quite competitive with the advice of the IS Industry board. CONACYT certified the graduate program, while the undergraduate program reached its maximum demand by new students. Having several hardware and software vendors at the IS industry board allowed the UIA to have huge discounts vis-à-vis the hardware and software market cost. Furthermore none of the boards' members promoted his company products in the board meetings or at the University. On the contrary, they submitted proposals to enhance the computing infrastructure with donations, or with discounts of up to 80 percent for software and 52 percent for hardware. This helped a lot, since the University's computing infrastructure was the main concern together with curricula updating, when the board was constituted for the first time in late 1987. The lesson is that high caliber IS executives are usually willing to participate and contribute to universities' development. None of the IS executives invited to the IS board rejected the invitation, and all of them closely work with the Department Chair without any economic compensation.

As for the faculty part, it is true that when faculty takes part in industry projects, they can be invited to become part of the company, and leave the University. Even though it happened several times, it should not be seen as a failure in the industry-university relationship. On the contrary, it involves a high quality evaluation of the university team, and it also contributes to the university prestige, social recognition, and professional fitness. The other concern regarding faculty, that they become more and more involved in industry projects, versus other academic activities, is also true. The way this private university managed to avoid this undesirable output was to limit faculty participation to one or two projects per year depending on the duration and time demand of them. We find out that some professors were not enthusiastic toward taking part in industry projects. However, little by little they accepted the possibility, given the high potential involving industry.

VII. CONCLUSIONS

This private university experience with IS industry boards demonstrates several critical success factors, including top management support, the chair's interpersonal skills, board member selection, proper board management, and establishment of university policies regarding industry-university collaboration. The President and the university's top management should be aware of the fast moving aspects of technology. It is critical for the quality and even viability of IS programs to keep up to date with current technology and industry practices. If the IS board strategy is selected to foster industry-university collaboration, the University President should take care of the board protocol, and the university's top management should set IS industry project policy. This policy should address project costing, faculty and student participation, project overhead, and income distribution. Lastly, university's top management should be aware that some projects will fail, and that faculty departures to industry will occur, due to successful projects.

In order to succeed in productively working with an IS board, the IS Department chair should have outstanding interpersonal skills. Under the IS board strategy to promote industry-university collaboration the IS chair became the link between the board and its members and the university top management, the department faculty, the students, and the IS programs. To succeed in properly linking different goal and visions, the chair has to play several roles and to interact with different groups in different settings.

Another condition to succeed in industry-university collaboration through IS boards is the board member selection. First, the board candidates should be invited after a careful assessment of the IS programs situation and program's goals settings. Then the university can seek high caliber IS executives to invite. This invitation should be addressed with the program evaluation and desired goals, so future IS board members can weigh their potential contributions.

Lastly, the IS board should be managed. That is to say, the number of meetings per year, the agenda of the meetings, the protocol before and after the meetings, and the board communications call for scrupulous control. A high caliber IS executive cannot be expected to attend more than three meetings a year. The meetings should be arranged in an executive fashion. Board members should have all the materials and the agenda in advance, with clear meeting objectives. The board should be notified of the progress and task fulfillment of the IS programs.

There are some differences in these successful factors for a developing country and an advanced one. The faculty differences are the most important ones. To start with, faculty in Mexico do not have access to a tenure track academic career. Few universities require graduate studies to become an undergraduate professor. Consequently, academic careers in IS are not positively regarded compared with IS industry careers. This places a double challenge to university management: (1) to hire young faculty and (2) to train and to retain excellent professors.

On the other hand, there is no difference between a developing country and a developed one is on the salary gap between faculty and IS industry positions. IS Industry boards, promoting industry-university collaboration, can help in closing this salary gap. The IS industry board can contribute to the quality of IS programs, the availability of computers labs, the size and quality of internships for students, and the research productivity of professors.

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