STUDYING OFFSHORING THROUGH A STUDY-TOUR OF TAIWAN AND CHINA

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Abstract

In recent years the pace of offshoring knowledge-based technology jobs has quickened. This is primarily due to the advances in communication technology and the availability of a large low-cost talent pool in developing countries. As a result, American engineering graduates will compete and collaborate with their counterparts in other parts of the world. It is critical that they understand the dynamics of a global economy and recognize the need to acquire the skill set that enables them to succeed. To this end, the College of Engineering at San Jose State University has established a one-million dollar Global Technology Initiative (GTI). The initiative sponsored a one-unit course that culminated in a two-week all-expense-paid study tour to Taiwan and China for 25 students, selected from 90 applications, in summer 2004. Taiwan and China were chosen because of their links to the value chain of Silicon Valley's technology industry. On this tour, our students visited a variety of technology enterprises as well as educational and research institutions. They had an opportunity to witness first-hand the high level of interconnectedness of Taiwan's and China's businesses with those in Silicon Valley. The students described their trip experience as transformative, and many of them changed their study and career plans after the trip. Each of the 25 students presented the lessons he or she learned from the study tour to an enthusiastic crowd of over 100 engineering students. Such increases students' awareness of global issues and we expect to have many more students interested in the GTI study tour of 2005.

1. Introduction

As the debate on the costs and benefits of offshore outsourcing rages on, many technology companies in Silicon Valley have already established extensive global operations. Furthering the globalization trend are compelling economic considerations such as low costs, availability of a large talent pool, and potential markets of regions outside the U.S. It is a fact that American engineering graduates will compete and collaborate with their counterparts in other parts of the world. It is critical that our students understand the dynamics of a global economy and realize the need to develop a high-valued skill set that gives them competitive advantages. To this end, the College of Engineering at San Jose State University (SJSU) has established a one-million dollar Global Technology Initiative (GTI) with an objective of providing American students a global perspective with an emphasis on the technology and business developments in the Asia-Pacific region.

The initiative sponsored a one-unit course that culminated in a two-week all-expense-paid study tour to Taiwan and China for 25 students in summer 2004. Taiwan and China were chosen because of their links to the value chain of Silicon Valley's technology industry, in which most of our graduates work. The 25 GTI fellows were selected from 90 applications, each of which included a 500-word essay on how the study tour may impact the applicant's career plan. The GTI fellows were selected based on their academic achievement, essays, and record in community service. Special attention was paid to applicants' leadership experience as the fellows were expected to share their study-tour experience with their classmates so that the impact of the study tour was not limited to the 25 GTI fellows.

We chose visit sites such that the GTI fellows can have a big picture of an ecosystem for technology industry. The sites include different nodes of industry's value chain and companies of different "nationalities." Also included are institutions providing the infrastructures for technology industry: universities, research laboratories, and industrial parks. To deepen students' understanding of what they would witness during the trip, pre-trip lectures were given on topics ranging from regional competitive advantages to Chinese culture. The lectures were jointly developed and delivered by professors from business, humanities, and engineering.

Many of the GTI fellows regard the study-tour as a life-transforming experience. They were shocked and awed by the level and scale of developments in Taiwan, Beijing, and Shanghai. They came to realize how competitive and hardworking their counterparts are and how important it is for them to be innovative as to generate high values. Many of them decided to pursue graduate degrees immediately after the completion of their undergraduate programs. In addition, many of them became more concerned about environmental and energy issues and would like to make the world a better place to live for all. Through a systematic dissemination of lessons learned by the GTI fellows, more students in the College are interested in global issues. We expect to have a much bigger applicant pool next year.

This paper focuses on the educational contents of the GTI course, which includes six pre-trip lectures, 27 site visits (including three universities, 20 companies or government research laboratories/incubators, and four national historical landmarks), and lessons learned by the students. Section 2 of this paper presents the background for the Global Technology Initiative and its mission. Section 3 provides an overview of the 2004 GTI course with its study-tour. Section 4 summarizes lessons learned by the students about global engineering workforce and economy. Possible improvements for future GTI courses are presented in Section 5. Concluding remarks are given in Section 6.

2. Background of the Global Technology Initiative

Outsourcing has been promoted as a strategy for private enterprises and public agencies to reduce costs and increase efficiency by having them focus on their core competencies and to contract out non-core activities to external specialists. Lower cost not only increases competitiveness but also induces demand; higher efficiency comes not only

from capitalizing on the core competencies of external firms but also from higher returns of invested capital. There has been relatively little controversy about outsourcing. However, offshore outsourcing or simply "offshoring" as a corporate strategy or a governmental practice has stirred up heated debates because offshoring may be perceived to contribute to the loss of American jobs.

Proponents of offshoring often cite a recent study by McKinsey Global Institute, an economics think tank within McKinsey & Co., a management consulting firm. In this study, it is stated that the U.S. economy recovers approximately $1.13 for every $1 that goes to an offshore location [1,2]. Porter [3] argued, "Paradoxically, the enduring competitive advantages in a global economy lie increasingly in local things – knowledge, relationships, and motivation that distant rivals cannot match." As the debate about the pros and cons of offshoring at the national level rages on, the job loss at Silicon Valley since 2001, which has been compounded by the "dot.com bust," has been significant. Joint Venture: Silicon Valley Network recently stated [4], "Silicon Valley lost approximately 5% of its jobs between the second quarter of 2002 and the second quarter of 2003. The rate of job loss has slowed from the same period during 2001 to 2002, when Silicon Valley lost about 10% of its jobs."

Regardless of the outcomes of the debate or research, current and future Silicon Valley engineers should be prepared for the reality of offshoring. We, as engineering educators, should do what is within our control to guide our students toward their career success in this era of global economy.

In order for SJSU students to thrive in the highly competitive global economy, it is critical for them to develop international perspectives and knowledge. To this end, the College of Engineering has established a one-million-dollar Global Technology Initiative (GTI), whose mission is to give American students a global perspective with a focus on technology and business developments in the Asia-Pacific region. The donors of the initiative are business leaders in the high-technology industry with strong business ties in Silicon Valley and the Asia-Pacific region.

The objectives of the one-unit course sponsored by the initiative are:

- Raise the level of student awareness of global competition in the global value chain, including physical supply chain and knowledge supply chain;
- motivate students to acquire high-level skill sets desired by Silicon Valley corporations; and
- help students identify new career opportunities.

3. Overview of the Study Tour

The study-tour course has three parts: pre-trip lectures, site visits and post-trip activities. Taiwan and China were chosen as the destination for the study tour because of their links to the value chain of Silicon Valley's technology industry. Both countries have been very competitive for many years in parts of the physical supply chain of the

semiconductor industry, particularly in manufacturing. They have also become increasingly competitive in parts of the knowledge supply chain. Joint Venture: Silicon Valley Network recently stated [5], "China has become the number-one supplier of high-technology goods to the United States. Over 90 percent of personal computers are now manufactured in Taiwan. ….. In addition, regional markets, especially those in Asia, are growing. For example, by 2010, it is estimated that 46 percent of the semiconductor market will be in Asia."

3.1 Pre-trip Lectures

The course provided six two-hour lectures to prepare the GTI fellows for the trip. The first lecture was an overview of the study tour, including pre-trip and post-trip activities. Three professors from SJSU's College of Business presented the next three lectures on international competition, how to do business internationally, and innovation and entrepreneurship. These three lectures gave our students a broad outline of the global economy and Silicon Valley's role as the world's center of entrepreneurship and technological innovations. The fifth lecture provided students with the cultural background of Chinese societies by comparing the Chinese culture with that of the western world; it was taught by a humanities professor specializing in Chinese philosophy. The sixth lecture is a three-hour campus-wide orientation offered to all SJSU summer study-abroad students.

3.2 Site Visits

The study tour covered 27 site visits, including visits of three universities, 20 companies and government research labs/incubators, and four national historical landmarks.

During the study tour, we visited six major cities: Taipei and Hsinchu of Taiwan; Hong Kong, Beijing, Shanghai and Suzhou of China. Taipei is the political and commercial center of Taiwan, while Hsinchu is the Silicon Valley of Taiwan. The high level of commercial activities in Taipei is symbolized by Taipei 101 (Taipei Financial Center), the tallest building in the world. In the manufacturing area, our students were surprised to learn that Taiwan Semiconductor Manufacturing Company (TSMC) has almost 50% market share of the world's semiconductor foundry business. It, together with a competitor in the same Hsinchu Science Park, possesses almost 75% of that market. These are capital-intensive companies building new fabrication plants at $3 billion U.S. dollars per plant. The technologies being developed are leading edge, i.e. 65 nm. We visited Hong Kong on our way from Taiwan to China; the high population density is evidenced by the "forest" of skyscrapers. Beijing is the capital city of China. In addition to the prominent presence of government, Beijing's cultural heritage and business developments are impressive. Shanghai is the most commercial metropolitan area of China. It looks and feels much different from Beijing, and it is difficult to imagine that it is part of the same communist country. Suzhou is a satellite city of Shanghai. It has two huge industrial parks; we spent one full day in those two parks and visited three high-tech companies.

In those cities, we visited companies, universities and cultural sites. We visited U.S.-based companies, Taiwanese and Chinese companies. They covered a range of functional specialties: manufacturing, sales, product design, and research and development. The manufacturing activities visited range from contract electronics manufacturing (Solectron at Suzhou, near Shanghai) to semiconductor fabrication (Taiwan Semiconductor Manufacturing Company (TSMC), Semiconductor Manufacturing International Corporation (SMIC)) to consumer product production (National Semiconductor; BenQ (Acer)); the US sales organization visited included HP Taiwan and HP China; the product design activities visited span both hardware (SunPlus) and software (BEA China, Essence Technology, Solustek, AcornSoft); the research and development organizations visited range from consumer product development for the world market (HP Product Development Center of Taiwan, Foxconn/Ambit) and that for a huge local market (Intel China Research Center, Lenovo – Legend computer, which proposed to acquire the Personal Computing Division of IBM in December 2004).

We visited three universities (National Central University in Taiwan, Tsinghua University in Beijing and Fudan University in Shanghai) and one research organization: Industrial Technology Research Institute (ITRI of Taiwan). Students in Taiwan and China are very friendly and seem to be more focused on their study than US students, perhaps due to the fierce competition. We also visited several government-sponsored incubators, which are a unique feature of the two nations visited. They are Hsinchu Science Park and Nankang Software Incubator of Taiwan, and Shanghai IC Design Center. ITRI also serves incubation purposes. We also visited a private incubator: Acorn Campus Shanghai. Our site hosts educated and entertained us and shared with us their company histories and success stories in the most gracious way.

The cultural sites visited range from the world-renowned Great Wall of China and the Forbidden City of China and the National Palace Museum of Taiwan to the fascinating Wan-Hua Night Market (also known as the "snake alley") and the Long-Shan Temple of Taipei, Taiwan.

3.3 Post-Trip Activities

The study-tour participants were required to take notes during the visits and share their reflections with the delegation after each visit. After they returned to campus in Fall 2004, they were divided into six teams with each studying one of six subjects: Culture, Technology/Business Infrastructure, Political Issues, Global Technology Value Chain, Education and "WOW." Each team made a 30-minute presentation in a college-wide forum which was attended by hundreds of engineering students. The participants also conveyed their experience and lessons learned in many other formal or informal occasions, e.g., student club meetings and new-student orientations.

4. Students' Lessons Learned

After the study tour, we asked each of the 25 students to summarize in an essay the most important lessons they had learned and the most significant impacts the study tour had

made on them. The overwhelming response is their new awareness of the closing technological gap between the US and the two countries. This indicates that we have achieved the primary objective of the study tour. Other responses can be partitioned in two groups: actionable vs. non-actionable. The latter consists of "government support for industries and universities," "incredible, once-in-a-lifetime or life-changing experience," "camaraderie, bonding, friendships and discussions developed among the participants," "top host-company managers' sharing of their thoughts," "hosts' hospitality," "Chinese culture's emphasis on family units, name and reputation," and "Fun."

We conducted a survey about 20 possible actionable lessons or impacts and asked the students to rank the top five. The 20 questions are grouped into three categories: changes in career plan or planning, changed attitudes and stronger desires to learn more about the world. For each of the question, we asked the student to answer "Yes" or "No." Among those "Yes" answers, we asked the student to identify the top five lessons or impacts first and then rank the five from 1 through 5, with 1 signifying the top impact. To somewhat quantify the importance of the 20 possible impacts, we first assign weights of 5, 4, 3, 2 and 1 to 1st, 2nd, 3rd, 4th and 5th most important impacts and then add them across all students to obtain 20 "impact scores." All 25 students responded to the survey. Note that we explicitly asked the student to answer "Yes" if and only if the impact resulted from the 2004 study tour. For example, in one of the 20 questions, asked them if they decided to go to graduate school as a result of the 2004 study tour. Some of the 25 students had already decided to go to graduate school prior to participating in the study tour, and they were reminded to answer No for the question.

Based on this survey, we learned that the most important actionable lessons or impacts for the students are as follows, with the corresponding impact scores provided in the parentheses:

- I realized the importance of innovation and entrepreneurship. (59)
- I would like to travel to see the world more and learn about those things not learnable in the classroom. (53)
- I decided to go to graduate school. (29)
- I will consider or take advantage of career opportunities overseas. (27)
- I became more passionate about learning; I studied harder. (26)
- I would like to make the world a better place to live for all. (25)
- I became more concerned about environment and energy issues. (24)
- I began to seriously think about career planning. (22)

5. Areas For Improvement

Based on the student feedback received during the "suggestion session" or via e-mail, we identified the following areas for future improvement:

- More direct linkage between the pre-trip lectures and the site visits
- More efficient use of time by studying the companies to visit before the trip and keeping general company introduction during the visit to the minimum

- More depth for company visits - to spend more time at each company, but visit a smaller number of them
- More breadth for company visits - to visit a wider spectrum of companies to benefit participants of all seven majors.

To make improvement in the four areas listed in the previous section, we plan to partition the team of 25 student participants of the 2005 study tour into three groups and have each group work on a project starting with their pre-trip activities through the culminating debriefing presentations to the entire College of Engineering. Through a thorough study of the host organizations during the pre-trip activities, we plan to request more in-depth presentations and collaborations during the visits. We plan also to broaden our scope of visits so as to make it more relevant to all engineering students of the College.

A major new skill required to succeed in this global era is the ability to work in multi-function teams. To further improve the program, we will include three business students and one humanities student to provide to our students firsthand experience in working in such teams. These business and humanities participants will be able to benefit the engineering participants through interjecting their perspectives on the global economy; they themselves will also benefit from the engineering-focused professional visits and the interaction with engineering students. We plan to also visit Silicon Valley companies to learn about their desired new skill set from their job applicants as well as to learn their operations, for comparison with their foreign operations or with the operations of China-based or Taiwan-based companies.

A common belief about the strengths of the Silicon Valley is the unique combination of innovation and entrepreneurship. The participation of the three business students may provide a context in which the participants can learn the value of engineering-business collaboration first-hand for innovation and entrepreneurship. Participation in the Fall 2005 Neat Ideas Fair sponsored by the SJSU College of Business to encourage innovation and entrepreneurship will be encouraged. In fact, one of the 25 GTI students participated in the Fall 2004 Neat Ideas Fair, and his team and the innovative idea were featured on San Jose Mercury News.

6. Conclusion

The primary objective of the 2004 inaugural trip was to raise the awareness of the global competition in the engineering profession, and that has been met. However, several areas for improvement have been identified. More integrated activities across pre-trip, trip and post-trip activities are being planned. We anticipate a larger number of applicants and a significantly improved program for 2005.

References

[1] The McKinsey Global Institute, "Offshoring: Is it a Win-Win Game?", McKinsey & Company, San Francisco, August 2003.

[2] M. N. Baily and D. Farrel, "Exploding the Myths about Offshoring," The McKinsey Global Institute, McKinsey & Company, April 2004.

[3] Porter, M.E., "Clusters and the New Economics of Competition," Harvard Business Review, Nov.-Dec. 1998.

[4] Joint Venture: Silicon Valley Network, *The 2004 Index of Silicon Valley – Highlights,* http://www.jointventure.org/publications/index/2004highlights.html, accessed on March 1, 2005.

[5] Joint Venture: Silicon Valley Network, *Building the Next Silicon Valley: A Report to the Community*, http://www.jointventure.org/publications/buildingthenextsiliconvalley/nsv.html accessed on March 1, 2005.