STRATEGIC ANALYSIS OF A FABLESS SEMICONDUCTOR COMPANY FOR SETTING UP OFF-SHORE DESIGN CENTRE

by

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ABSTRACT

SEMILINK is a fabless semiconductor company that primarily focused on the communication chips industry before 2001. Since the meltdown of the Internet bubble, the communication industry that was closely related to the Internet has suffered the tremendous pressure of shrinking demand and increasing competition.

This paper involves extensive analysis of the industry landscape and the competitive forces that shape the industry and companies within by using powerful tools such as *Porter's Five Forces* and *Industry Value Chain Analysis*. Based on the discussion, Key Success Factors (KSF) are introduced. A comparison amongst competitors including SEMILINK against the KSFs is undertaken in an effort to identify any steps that SEMILINK should take to be more strategically competitive. As a result, the study found that SEMILINK should consider setting up offshore design centres in China to fundamentally improve its cost structure for the current R&D operations. Internal Analysis was deployed in evaluating SEMILINK's fit/capabilities of adopting the China Design Centre option.

DEDICATION

To my parents who taught me about the importance of education, supported me with their hearts, and believed that I could achieve all that I put my mind to.

ACKNOWLEDGEMENTS

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GLOSSARY

DSL	**D**igital **S**ubscriber **L**ine is provided by service providers for home users to access Internet through existing phone lines.
DSLAM	**D**igital **S**ubscriber **L**ine **A**ggregation **M**odule is a device that acts like a hub to take in multiple DSL lines from home.
ASIC	**A**pplication **S**pecific **I**ntegrated **C**ircuit is a chip designed for specific purpose or application only. It rarely can be used for other applications without modification.
Fabless	A **Fabless** semiconductor company is a company which owns a manufacturing facility.
MIPS	A **M**icroprocessor without **I**nterlocked **P**ipeline **S**tages is a special type of CPU that uses specific lower-cost instructions. It is a trademark for MIPS Technologies.
SOC	**S**ystem-**O**n-a-**C**hip is a design type where a single chip contains multiple chips on it to achieve cost reduction
OEM	**O**riginal **E**quipment **M**anufacturer is a producer who manufactures products to its customer who in turn package/modify the products before distributing them to end users/customers.
ODM	**O**riginal **D**esign **M**anufacturer is a contract manufacturer that utilizes its own design.
SAS/SATA	**SAS** stands for **S**erial **A**ttached **S**CSI where **SATA** stands for Serial ATA. **ATA** is short for **A**dvanced **T**echnology **A**ttachment. A technology combines controller and hard drive on one device.
SCSI	**S**mall **C**omputer **S**ystem **I**nterface used to connect computer devices like external disk drives and scanners.

1 INTRODUCTION

1.1 Summary Issue Statement

Burnaby based telecommunications company SEMILINK has seen slow growth in its key business area over the years. Communication products represent more than 80 percent of its revenue, and 95 percent of its profit. Although sales from the Asia Pacific region show positive signs, North American and European current revenue projections are flat and the revenues are expected to follow a downtrend.

In an effort to combat the financial predicament, over the last few years the company has undertaken some initiatives to reduce costs, boost operation efficiency, and to expand the income-generation revenues. However, for the process to work, SEMILINK requires more foresight. To be competitive and ultimately successful, SEMILINK needs to find ways to significantly reduce costs and broaden product lines. One key option, to be evaluated later, is to take advantage of the very inexpensive R&D resources and capabilities in China. In this way, SEMILINK could relocate its design centres offshore, thereby drastically lowering its R&D costs. Then SEMILINK could pursue its differentiation strategy.

The intent of this project is to analyze the semiconductor company SEMILINK, its current business operations, and to make strategic recommendations. By request, the semiconductor company name in this essay was altered to protect the identity of the firm.

1.2 Analysis methodologies:

Porter's Five Force Model will be deployed as a tool to simulate SEMILINK's industry, and to search for Key Success Factors (KSF). To search for, and confirm, KSFs, the Value Chain also will be analyzed. The next section of this paper will consist of the analysis of competitive rivalry using the KSFs, determining opportunities, and threats which will be used to propose strategic alternatives. In order to evaluate and test the feasibilities and overall fitness within the organization, the alternatives will be fed into the Diamond-E Model. Addressing gaps in capabilities is required for the strategy to work. There will be several proposed recommendations by the end of this essay.

In the process, the remaining key sections of this essay will consist of the following:

First, detailed industry analysis shall be undertaken through the mapping out of SEMILINK's telecommunications industry using Porter's Five Force Model. As products go through various stages of the value chain for the semiconductor industry, thorough analysis will be conducted to review the value adding steps and the ensuing implications. SEMILINK's competitor analysis will further triangulate potential areas that the

company should focus on to improve key success factors and to facilitate competitive advantageousness.

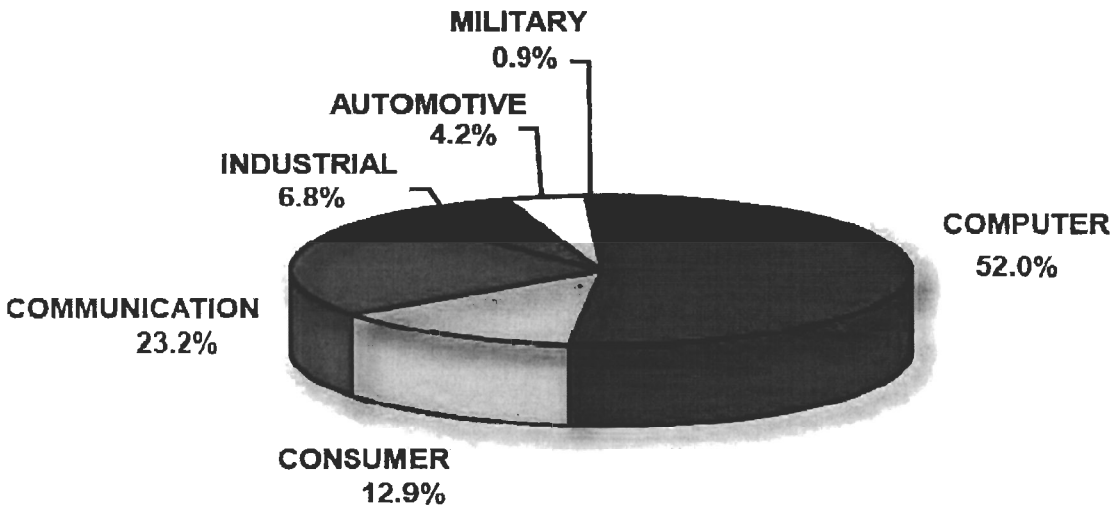
Second, as initial alternatives become available, effort will be spent on the practicality of implementation. Internal analysis will look at various aspects of internal factors such as Management Preferences (MP) and Organization. In addition, it will take into account the available resources for further clues of overall corporate fitness, and to determine capability gaps that must improve to ensure the success of the proposed strategic alternative.

Finally, recommendations will be formed based on the supporting information discussed in the previous sections.

1.3 Industry Overview

According to Gartner's reports, worldwide semiconductor revenue for 2004 was roughly $220 billion. Projected sales for the industry in 2006 will be in the area of $240 billion. Most of the growth will be in segments other than the Communication Segment that SEMILINK is in. The following is a quick look at the revenue distributions from different segments of the entire industry in Figure 1.1.

Figure 1.1 Industry Revenue Distributions in 2004



Source: SIA, Semico Research Corp.

SEMILINK is a semiconductor company that sells primarily in the communication sector of the industry. It suffered a major decline in 2000, and has then been flat since 2002. Currently, the consumer sector is the sector that has the most growth potential.

1.4 Company History

SEMILINK was founded in 1993 as a spin-off of Telus' Microelectronics division. Initially, the firm had approximately 30 employees doing integrated circuit (IC) designs. Its products focused exclusively on telecommunication Core Transport switching for

large Telecom customers. Starting in 1997, the company expanded rapidly as the Internet picked up speed. Its sales were to come from large businesses, such as Nortel, Lucent and Cisco, which exploded in growth and revenue generating capabilities together with the huge Internet infrastructure build-out investments. By the year 2000, SEMILINK had 1700 employees, 250 million dollar quarterly sales, a stock price of 250 dollars, and ranked the largest publicly traded BC business in terms of Market Capitalization at about 25 billion dollars.

1.5 Company Profile

SEMILINK is a leading provider of broadband communications and storage semiconductors for enterprise, access, metro, storage, wireless infrastructure, and customer premises equipment. The company offers worldwide technical and sales support, including a network of offices throughout North America, Europe and Asia. The company is traded publicly on the NASDAQ Stock Market. As well, the company has two key divisions. (SEMILINK, 2006)

Service Provider

Within the service provider market, SEMILINK sells more than 150 products that go into routers, switches, DSLAMs, media gateways, and wireless base stations. Key customers of this business unit include Alcatel, Cisco, Ericsson, Fujitsu, Juniper, Huawei, Lucent, Nortel, Samsung, Siemens, and ZTE. The packetization of various elements of the

networking hierarchy, starting with DSLAMs, should be the most important driver in the 2006-2007 timeframe. Wireless infrastructure continues to be an emerging market for SEMILINK, and the company's voice over IP roadmap includes residential gateways, home routers, and home appliance applications. SEMILINK expects the metro transport market to offer some of the best growth opportunities over the next year. In addition, SEMILINK's primary competition within the transport market remains ASICs. Aside from ASICs, SEMILINK's other primary competitors in the transport market includes Agere, SEMILINK-Sierra, AMCC, Exar, Infineon, Mindspeed, TranSwitch, and Vitesse.

Enterprise

SEMILINK's efforts in the enterprise market involve the company's push into the storage market, as well as their work with MIPS microprocessors. The company plans to transition some of their MIPS processor business from stand-alone MPUs to SOCs. Additionally, 70 to 80 percent of the company's products in development are SOCs that utilize MIPS processors; SOCs could eventually comprise nearly 80 percent of total company revenues.

It is expected that the company's storage segment will generate growth for the company, and could account for roughly ten percent of total revenues. This will be up from the current low single digits by the end of the year. The company has significant design wins with tier-1 OEMs and ODMs. For example, Hewlett Packard recently announced they would use SEMILINK's solution for HP's new Enterprise Virtual Array System (EVA 4000, 6000, & 8000). Additionally, within the fiber channel market, the company has approximately 50 design wins to date, and in the SAS/SATA market, the company has

over 60 design wins to date; with an additional 80 design wins still pending.

The company operates in fabless mode, meaning it does not own any fabrication facility, nor does it have any packaging plant. The firm focuses mainly on the design aspect of the value chain, and outsources most other activities including fabrication and packaging. As of today, it has approximately 1100 employees and 12 design centers in Burnaby, San Jose, Allentown, and Israel. It also has 20 sales offices throughout the world with emphasis in North America, Europe and Asia.

SEMILINK's projected revenues for 2006 are nearly $300M. It has roughly 0.7 percent of the total communication chip industry, which is $55 billion as predicted in 2006. The entire industry grows at a rate of flat to 5 percent, whereas SEMILINK grows at a near flat rate. Gross margin is sitting at around 70 percent. Annual profit is in the range of $40M-$50M.

1.6 SEMILINK Current Strategy Analysis

The following chart provides detailed analysis for key aspects of the firm's competitive strategies from a cost-based and/or differentiation oriented perspective.

Table 1.1 SEMILINK's Strategic Fit Chart:

	Cost-Based	1	2	3	4	5	6	7	8	9	10	Differentiation
Product Strategy	Rapid Follower	■	■	■	■	■	■	■	■	■	■	*Innovative*
R&D Expense	Low R&D	■	■	■	■	■	■	■	■	■		*High R&D*
Structure	Centralized	▒	▒	▒	▒							*Decentralized*
Decision Making	Less Autonomy	▒	▒	▒	▒	▒						*Autonomy*
Manufacturing	Economies of Scale	▒	▒									*Economies of Scope/Flexibility*
Labor	Mass Production	■	■	■	■	■	■	■	■	■	■	*Highly Skilled /Flexibility*
Marketing	Comparative/Push	▒	▒	▒								*High Cost/Pioneering*
Risk Profile	Low Risk	■	■	■	■	■	■	■	■	■		*High Risk*
Capital Structure	Leveraged	■	■	■	■	■	■	■				*Conservative*

Adapted From Bukszar(2006) class notes

An overview of SEMILINK's generic strategy:

As a hi-tech company that focuses on cutting-edge technology, SEMILINK focuses on clearly defined differentiators. The company runs on a higher cost model where R&D cost, for example, equals 45 percent of the revenue. In addition, the key challenge is to control the cost intelligently to support differentiation strategy. What follows is the detailed analysis on all the key variables and the basis for the scores.

Follower/Innovator:

SEMILINK fits well in the innovator category with a perfect score of 10. In the communication semiconductor industry, whichever company leads the trend, and offers products with unique features, wins the largest market share. The industry itself went through multiple cycles, with the last one starting with the booming era of 2000, and ending in the recession of 2000-2005. We have seen rapid consolidations where large well-run companies take over well positioned, but not well-funded, smaller companies, while poorly run and badly positioned companies went under.

SEMILINK has to be innovative to survive the fast paced and fiercely competitive environment where a product cycle is potentially as short as just one year. If the newer and better-positioned product does not reach the market within that window of opportunity, the existing product risks phasing-out as it faces zero future revenue. In this market, a business follower has very little room to survive.

SEMILINK has on average 400 design wins in a single quarter. It is an indicator of how innovative SEMILINK has to be in order to be in a position to secure future market shares.

R&D Expense:

Again, SEMILINK scored high in this area. As an innovator, SEMILINK has to be ahead of the curve all the time to be profitable.

Chip design is a very capital-intensive business. With highly skilled workers and engineers, the cost of labour is extremely high. On average, each engineer's salary package ranges between $100 thousand to 150 thousand per annum. It takes a team of many engineers up to a year of labour to produce a single chip, depending on the complexity. On top of that, the software tools and testing equipment are highly specialized, and extremely expensive. For instance, SEMILINK spends around $10 million on maintaining the software licenses alone each year. Specialized tools and tasks need to run on very powerful computing infrastructures. A typical CPU server that takes board design jobs could easily cost a quarter of a million dollars. Finally, not all the chips made have cost so much capital upfront when hitting the market as a final revenue-generating product.

Compared with companies that are cost-based rapid followers, SEMILINK's R&D related expenditures are much higher in terms of percentage of sales.

Structure/Decision Making:

SEMILINK scores in the direction of less autonomous centralization. This is mainly due to how SEMILINK operates. As a medium sized semiconductor company with over one thousand employees, SEMILINK's business focus is in communication -- having only recently added storage as the secondary product direction. SEMILINK's product strategy is to provide customers with telecommunications equipment that focuses primarily on switch core to metro transport.

The company requires much coordination and centralized decision-making. The current CEO is an engineer. He worked his way up to the top management position within SEMILINK. Moreover, he has a great deal of knowledge about the industry, as well as a good technical understanding of how an engineering firm operates successfully and profitably. SEMILINK's CEO is a very hands-on leader who participates in all key technical decisions. He oversees large capital spending, as well as high-level strategic decision-making.

Overall, SEMILINK's 4-5 out of 10 score reflects its positioning in the Structure and Decision Making variable. Considering the balance among company size, product mixes and industry characteristics, it does seem to be the right approach.

Manufacturing:

When it comes to production, the industry does have its character of economy of scale. Currently, most semiconductor companies are fabless companies.

Let us look at the production flow to see how that works and where the costs are. After the final drawing of a chip design is finished or "taped out", its design detail goes to a fabrication plant to be produced. Then the product verification follows to ensure that the product meets the specifications in terms of design and failure rate. The chips then go to packaging, and another round of verification, before the final products go to the distribution channels.

Of the above-mentioned flow, two processes are rather costly. The high-tech manufacturing facility alone costs tens of billions of dollars to build. Just to keep it running, yearly maintenance costs many billions of dollars. As well, the packaging factory itself has a billion-dollar price tag on it. There are very few semiconductor companies in the world (as of this writing) that are vertically integrating their design and production. Most firms are either design houses, or specialized producers. Consolidation of the chip manufacturing industry into major names, such as TSMC and United Charters, achieved absolute economy of scale in production. On the other hand, many other chip design firms focus exclusively on the design activity, and outsource their manufacturing to those specialists.

SEMILINK's operating practices provide a good example for overall industry standards. Whilst SEMILINK develops the design and maintains production verification, the production and packaging is outsourced to highly efficient producers in the Asian region. It fits nicely in the lower left side with a score of two for the economy of scale. Although it is quite common that innovators tend to position themselves to economy of scope rather than scale, due to the industry characteristics mentioned above, semiconductor design firms are proven to best operate financially on the economy of scale with the manufacturing practices.

Labour:

SEMILINK scores 10/10 for possessing an extremely skilled work force and a very high level of talent. To be a differentiator, skilled employees are required. A smart workforce greatly helps the company to be creative and successful in attaining design wins over peer companies.

Good chip design takes a tremendous amount of experience and a strong skill-set. Either the hardware board level, or the chip firmware, is very demanding in technical expertise. Managing design projects of various kinds requires more levels of complex competence and expertise.

On the other hand, highly skilled workers means higher labour costs. Hence, that explains why labour costs are the largest piece of R&D expenditures. Reducing costs on labour

while maintaining a highly competitive workforce is a great challenge for all multinational corporations.

Marketing:

SEMILINK's primary clients are from the business sector. That is why SEMILINK does not run expensive TV ads or other forms of commercial advertising. The marketing and sales teams are relatively small, while they have a very large design team in the background.

The company takes a similar approach in the marketing as it does in production. It outsources most of its marketing, sales, and distribution to the companies that specialize in both sales and distribution.

SEMILINK employs two key methods in its marketing and distribution strategies. First, SEMILINK utilizes local distribution channels to market the products on SEMILINK's behalf. Then SEMILINK organizes sales representatives and distributors meetings/seminars regularly to bring them up to speed about the new product offerings and technical details. The distributors then take SEMILINK's product information to their customers for marketing purposes. For example, SEMILINK forms strategic alliances with Avnet Memec, one of the largest electronics/chip distribution chains in the world. Avnet Memec has an extensive network of distributing offices that can reach very large geographically diverse customers. By using Avnet's efficiency in distribution,

SEMILINK has reached economy of scale in marketing its products throughout the world.

Secondly, SEMILINK also takes care of some of the marketing itself through direct marketing to key/strategic customers such as Cisco, HP, and Lucent. Its sales and marketing teams regularly visit customers to bring customers up to date on the current products, as well as new releases coming down the pipe. SEMILINK also maintains sales and marketing offices at key distribution centres. Marketing and sales specialists will go out with distributors attending customer visits and supports.

By doing so, SEMILINK can focus its attention more on the product development, and less on the marketing and distribution. Taking advantage of distribution channels and sales rep networks will enable SEMILINK to market with high efficiency and with the minimum cost.

The score of 3/10 truly reflects the way SEMILINK does its marketing. In comparison, most of SEMILINK's competitors and other fabless chip design companies deploy similar marketing strategies.

Risk Profile:

Risk is very common in SEMILINK's industry. As a result, lowering costs will reduce the risks that the firm faces while increasing the company's competitiveness.

As mentioned before, each chip typically takes a year to develop. With all the manpower involved, the hardware costs that go with it, and the production and packaging expenses, one typical chip could cost well over 10 million dollars. Additionally, there is the one to two years of development-time before it can be on the shelf as a final product. There is no visibility if a 'millions of dollars' investment can be profitable for at least a year or two. Most SEMILINK chips that are generating revenue right now were developed two years ago. Hence, one needs to be cognisant of the well-known fact that limited visibility generates risks.

Based on experience, only one out of four chips designed will make its way to final revenue generation and turn a profit. Strategically selecting the right product to develop is the most difficult task. If the wrong products are planned and developed, over time the company risks losing substantial revenues due to the shortage of a continuing supply of promising chips.

Finally, SEMILINK's communication chip design industry is over-crowded with many firms competing for a rather narrow market share. One wrong decision could have a profound impact on a company's long-term growth. It is a highly risky business. A score of 9/10 on the risk profile is the accurate score.

Capital Structure:

As discussed, a semiconductor company is very high risk. Hence, a semiconductor firm tries to minimize its debt load. Firms are conservatively financed to enable them to take advantage of opportunities as they arise and to create a cushion in case new product launches prove less successful than expected. In this way, firms do not need to bet the future on every innovation attempt.

Looking across the industry, SEMILINK's Broadcom and AMCC competitors have no debt whatsoever. The bigger names like Intel, Xlinx, and Cisco are carrying either no debt or very little debt on their balance sheets.

In the past, SEMILINK has been debt free. Only recently, SEMILINK started using debt instruments to acquire companies that have strategic synergy. Its latest purchase of a storage company provides a suitable example. SEMILINK took on $275M of convertible notes and bought a division from its holding company for $424M in cash. With company resources being what they are for SEMILINK, $275M is a rather large amount of debt; especially considering that SEMILINK has only roughly $200M left in cash to operate a capital-intensive high tech company that has more than one thousand employees.

A score of 7/10 is a good estimation of SEMILINK's Capital Structure variable. It is by no means the best structure in my opinion, but this score reflects its current, more

leveraged position. In the future, the firm is expected to pay down this debt to return to a more conservative structure and to enable it to take advantage of future opportunities, like the purchase of the storage company.

Summary:

SEMILINK has clearly set out to be an innovator or differentiator from day one. The firm relentlessly sought to be the leader of the field in technical supremacy and exclusivity for leading-edge products. Nevertheless, with lower growth rates and a highly competitive industry, it seems obvious that to improve the bottom line while the top line stagnates requires reducing costs innovatively while maintaining the differentiator nature.

1.7 Strategic Issues and Problems

Sustain and grow revenue for traditional business:

SEMILINK has seen its revenue stuck in the $300M range for the past few years. The trend was that key revenue generators showed signs of slowly declining. SEMILINK started as a communications chip design. In its early stages, the company developed a series of successful chips in the core switching and transport layer. Later on, as one of the

market leaders, SEMILINK supplied a large amount of high-end and high-margin chips to large customers such as Cisco, Lucent, Nortel and HP. The business was very successful as the Internet was booming. Its dominant position and high profit margins were in place. Following the burst of the Internet bubble, over-built infrastructure generated very little demand. As Internet growth slowed, the market demand shifted from core infrastructure-build to Metro and access level expansions such as DSL or cable modems. The market pushed towards the consumer end from the previously ISP driven core network deployment.

It becomes clear that in order to expand its business to other areas, SEMILINK needs to maintain the current Core Switching and Metro-Transport business for market share and profit margins.

Fair cost structure:

The equivalent of 30 percent of the revenue goes to manufacturing costs. Being a technology innovator, the firm runs high cost operations. Although it is quite common for competitors to run similar cost structures, there is no valid reason why SEMILINK should not intelligently lower the cost to gain a competitive advantage.

While production/manufacturing costs tend to be difficult to reduce due to the outsourcing nature, R&D costs, on the other hand, offer the possibility for some potential cost saving and innovative strategies.

Cash Flow/Balance sheet:

SEMILINK recently acquired two companies. The company paid roughly $400M cash to buy storage company A in an effort to diversify its business model so that SEMILINK could have two pillars that sustain the company's revenue stream: Telecom and Storage. The firm did another pure stock purchase of company B for $300M in the Fibre-to-home business. To cover the cash shortage of the first deal, SEMILINK took on a convertible bond of $250M. It leaves the company with less than $200M in cash and equivalent, and $250M long-term debt. SEMILINK is a highly innovative company. Traditionally speaking, it should carry no debt and hold substantive cash reserves. Leaving SEMILINK heavily leveraged might cause some problems in the future, particularly when another business downturn hits.

2 EXTERNAL ANALYSIS

This section will consist of a comprehensive analysis of the industry as a whole in terms of different forces that are at play which shape the overall competitive landscape. Porter's Five Forces Model and Industry Value Chain are used as separate tools examining the same problem. Key Success Factors (KSF) conclude the subsequent discussion. Parallel comparisons will be drawn using competitors against those KSF. Two goals are achievable as the results of the comparison. One is to deduce why strong competitors are superior, and by what KSFs. The second task is to figure out which one or multiple KSFs SEMILINK should improve on to be more competitive. Finally, the strategic alternatives are put forward for consideration to reflect those findings.

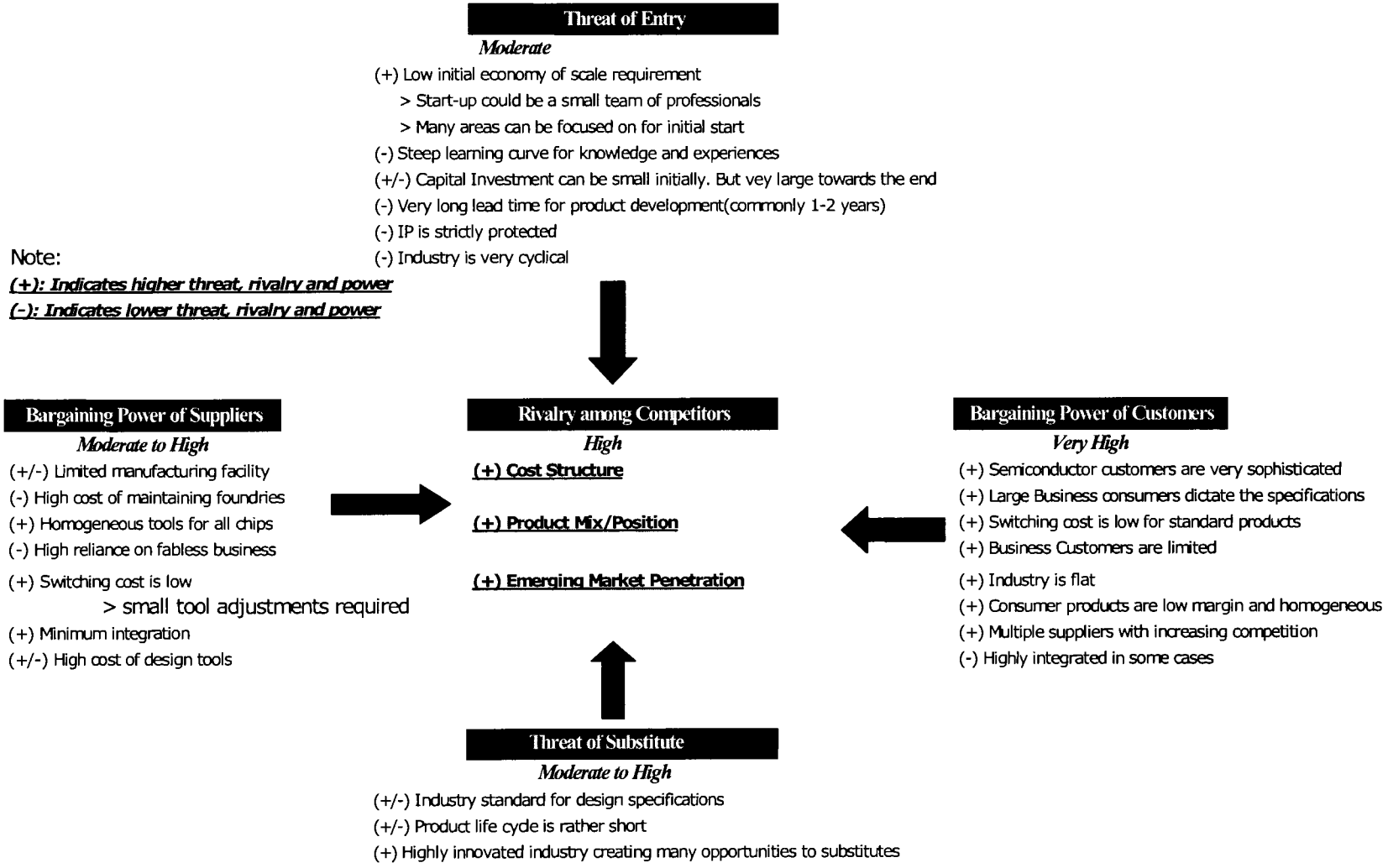
2.1 Industry Analysis

Traditionally, the semiconductor companies divide into four categories depending on their involvement in the value chains. The key-determining factor is the manufacturing facility ownership. The four categories are Integrated Device Manufacturer (IDM), Fabless, Foundry and Hybrid. There is minimal cross-category competition, and the categories are complementary. However, high levels of rivalry are evident within each category. SEMILINK belongs to the IDM group.

IDM typically conducts both design and manufacturing activities. Both of the activities are very capital intensive to run. Only the very largest corporations can afford to vertically integrate the foundry to their semiconductor design units -- IBM and Intel being prime examples. In fact, they are the only two semiconductor companies in the world who maintain a factory of their own. **Fabless** companies, on the other hand, do not operate factories. They outsource their manufacturing, and focus solely on design work as their core competency. Hundreds of semiconductor companies fall into this category including some well-known corporations such as Cisco, Broadcom and Xilinx. The third category is **Foundry**. Companies specialize in running and operating very large state-of-the-art manufacturing facilities such as Taiwan Semiconductor Company and United Charters. Lastly, **Hybrid** is a mixture of the other two or three types; Texas Instruments is a Hybrid company.

Beginning with Michael Porter's five forces chart, we will expand into detailed explanations of each force and examine specifics that shape the overall industry. Key Success Factors will be employed to determine the firm's winning or losing position in a competitive environment.

Table 2.1 Porter's 5 Forces Model



2.1.1 Threat of Entry - Moderate

Within the design industry, there are constant new entries. This factor relates to the forces that make it easier, or harder, for competitors to enter the industry. Overall, the real threat is moderate based on the following discussions.

Unlike the foundry industry where billions of dollars of upfront cost is a prerequisite to start the business, the fabless firm typically needs very little start-up cost to kick-start a company. A good concept, a few dedicated professionals, and a small pool of capital is all it takes to begin the process of starting and operating a successful fabless firm. In addition, the fact, the semi conductor industry is so huge with steady demands from the business sector and increasing demands from consumers. Innovation is the name of the game with plenty of opportunities in the market for newcomers.

However, in reality, smaller firms often find it hard to survive in the longer run. Although it is easy to start a small high tech company, it requires that many conditions must be met for a firm to prosper. Fulfilment of some of the conditions proves rather difficult. First, the idea or concept needs to be achievable and marketable. Second, the chip development team requires sufficient competency to deliver the product -- it takes a special pool of expertise and knowledge. Third, and most importantly, although the initial chip design is relatively inexpensive, the manufacturing of the final chip is extremely costly. Translating a design blueprint to a marketable product often carries a price tag up to two million dollars, and venture capital is typically involved in funding the process for the

first few phases. However, the investment may be pulled at any stage if it is believed that the risk is beyond their threshold.

Learning and experience: Chip design is an engineering art. It takes expertise and experiences. They are rather hard to grasp. It requires many years of hands on work and careful build-up. On top of those, skills are very specific. For example, in SEMILINK there are departments like Layout, Analog, Digital Access, Mix Signal and so on. Managing chip design teams and projects requires different sets of expertise. Chips are becoming more sophisticated. They routinely require a team, or teams, of engineers to produce. Management is critical to the success of the chip. A good chip needs both brilliant engineers and highly competent and resourceful managers.

Capital Intensive: Another factor that holds back new entrants is that chip design takes a long time from inception to reach the market. It can take two years for the chip to go through the initial design, manufacturing, testing, Q&A, packaging and final product phases. That is to say, the revenue will not be visible for at least two years after the initial investment. For instance, to reiterate a point, SEMILINK is selling chips designed two or three years ago. On top of that, most of the chip designs failed halfway through due to the lack of market demand or change of market conditions. Two years ramp-up time adds even further uncertainty to start-up firms and their investors.

Intellectual Property (IP) is well protected in the industry through patents and laws pertaining to IP in North America. It makes it impossible for a new entrant to copy

existing technologies without paying for them. It increases the cost and creates obstacles that newcomers have to overcome.

Cyclicality: The semiconductor industry is cyclical by nature. The cycle is typically a few years long. When a downturn strikes, the entire industry is impacted. Traditionally, the decrease in demand is very sharp and unpredictable. As with the SEMILINK' case in 2000, all consumers, competitors, and suppliers (foundries) were badly affected at that time. As a result, new entrants will find it very difficult to penetrate the market due to a sharp drop in demand, intense competition, and very limited access to venture capital. Many newly existent firms will cease operations because of the tough economic environment.

On the other hand, although the threat of a new market entry is not so great, since both the business and consumer market is price sensitive, the new entrant with the better-cost structure and a competitively priced product could prove to be a definite threat down the road. If the products that the new entrant brings are indeed newer and feature-rich, the threat to the incumbent company would be even greater.

In summary, the Threat of Entry is moderate in the industry due to high cost barriers. However, newer well-funded firms can present threats to the incumbent with a much lower cost structure and superior products.

2.1.2 **Bargain power of suppliers** – Moderate to High

In the fabless industry, manufacturing suppliers historically have had higher bargaining power in general. There are two kinds of factory supplies in the industry. First, is the material like wafer that is the building block of the semiconductor chips. Second, is the type of services provided by foundries to build the chips to precise specifications. Unfortunately, both of those are limited in terms of supplies (and service). Capacity is always limited. From the manufacturer's point of view, because of the prohibitive cost of building the facility, there is always a balance between the capacity and capital. A finite balance is reached between meeting the demand during good times, and by keeping the factory running during the tough times. As a result, supplies will always be a bottleneck to a certain extent. According to the basic economic supply/demand theory, the shortage of products will generate premium prices with the increased demand. It gives the supplier bargaining power and pricing flexibility. On the other hand, when the semiconductor industry turns south, the under-utilized facility will force foundries to lower their prices and beg chip design companies for more work in an effort to contain losses during difficult times. The supplier, in this case, has less, or negative, bargaining power.

Switching costs: In the modern semiconductor industry, chip specifications are quite standard in regards to the size of the chip, the width of the circuit lines, and the representation of each electronic circuit component. A state-of-the-art manufacturing facility is fully automated and pre-programmed. The tools to build different kinds of chips from different design houses are the same. Switching between one kind of chip production to another is rather swift and efficient, but normally costly. There is very little

integration between the design company and the manufacturing facility. The blueprint or final design is sent in tape or a file in GDS4 format from anywhere around the world to the central processing/control unit of the factory. Once verified, scheduled, programmed and produced, the final product will be out of the other end of assembly line for packaging. It does not matter if it is one hundred units or ten million units, or if it is from Cisco or a small start-up firm. Procedures are very similar.

At SEMILINK, engineers rely on design tools to design chip logics, layouts and circuit boards. The software tools are very expensive to acquire, maintain, and require costly training. There are quite a few different tools on the market from different suppliers. Once a company buys into a particular tool, it is very hard to switch to another due to existing investment in terms of money, training and infrastructures built around the tools. The supplier of the software, in this case, has high bargaining power.

To summarize the relationship between SEMILINK and its suppliers, there are many factors in play: supply/demand, switching costs and accessing manufacturing channels/facilities. Behind all the activities, cost control is still the key umbrella issue that governs all the other aforementioned sub-issues/factors. Reducing the cost of production is the primary reason why SEMILINK has to manage the supplier/manufacturing relationships rather than making the products on its own. Hence, cost proves to be a major KSF.

2.1.3 **Threat of Substitutes** – Moderate to High

There is a moderate risk for substitutes in the existing fabless design market place. There is more risk, however, in the emerging market where incumbent firms might lose out on market opportunities to competitors, or to newer start-up firms with brilliant concepts and excellent executions.

As the industry grows, so do the common standards and specifications within the industry. Some products are homogeneous to a very high degree. Does it create a Threat of Substitutes? In order to answer this question, the first step is to break down potential substitutes into two groups: start-up companies and large incumbent firms.

Economy of Scale: Start-up companies are unlikely to compete in the existing products field. Those companies backed by venture capitals are looking for very high returns. Their cost structure of higher production cost due to lower volume prevents them from operating in these lower margin and well-competed areas. They pose no threat to larger companies. By the same token, large incumbent firms do compete in these product areas, and are competing on the cost side with their gross margins. With globalization the way it is, the strategy and costs are so transparent that every firm knows what the other firms are doing. There is the moderate threat of losing out to the competitors.

High Switching Costs: With active innovations and product development, the life cycle of an existing product is reduced significantly. However, that does not necessarily mean opportunities for new firms to act as substitutes. Customers tend to rely more on the existing chip providers for updated products or solutions due to existing investment in

terms of knowledge, experiences, relationships and legacy product support. It is a classic switching cost issue. Unless there is a huge differentiation, or a brand new product line, newer players in the field have tremendous disadvantages in penetrating the market. However, a shortening life cycle does not affect existent providers if managed properly. With SEMILINK, for example, the company's core Telecom business has not decreased against other providers in terms of market share in an industry that has realized much growth for many years now.

Lower Entry Barrier for emerging products: On the other hand, the market is huge and presents unlimited opportunities. There is always room for newer concept technologies, innovations and for emerging markets to grow. Retaining already existing market share is one piece of the puzzle, where breaking into newer markets is another. It is the area where newer start-up firms have the best chance. When it comes to new and emerging products, SEMILINK did not do as good a job as Broadcom. In the year 2000, or even earlier, Broadcom saw the latest potential DSL modem and DSLAM market in China. They immediately acted on that while all the other competitors were realizing significant profits from North America markets. Six years later, Broadcom's first-mover advantage and strategy paid off with over billion dollars quarterly revenue and there appears to be even greater potential in the near future. Broadcom became one of the top twenty semiconductors in the world, and the leader by far in the field. In comparison, SEMILINK focused exclusively on the Telecom market in 2000. After the economic downturn, it neither reacted quickly enough, nor did it push aggressively enough to

diversify its business. As a result, six years later, revenue is still stuck around the 80-100M dollars range quarterly.

In short, while having the right product mix plus a good cost structure is extremely important, being able to penetrate newer and emerging market segments to compensate for increased competition in the existing market while fending off the threat of substitutes is another critical factor.

Key Success Factors include:

- ✓ Product Mix/Portfolio
- ✓ Emerging Market Penetration

2.1.4 **Bargaining power of Customers** - High

Due to highly concentrated providers for a smaller pool of large customers, the bargaining power of customers is very high.

Diversification/Lower risk: Fabless design house's customers, particularly business customers, were typically semiconductor companies in the past. They are very sophisticated when it comes to knowing their specifications, requirements and costs of production. To that extent, a smaller to medium-size design house such as SEMILINK is much like an outsourced contractor to large customers like Cisco, Lucent, HP and Nortel. Those large corporations are final product providers or solution providers. During the

2000 Internet bubble and shortly before that, those companies had done most of the chip design for their products in house in a virtually integrated fashion. After the industry downturn, they dramatically changed their strategy by outsourcing lots of design work to other medium size fabless companies like SEMILINK to reduce capital investment and risk. By doing so, they could focus more on their core competencies.

Lower Switching Costs: Treating fabless designers as outsourcing contractors gives the customers like Cisco great flexibility and bargain power to choose amongst providers who can meet their requirements with the lowest cost and highest quality standard. The customer dictates the specifications, schedule and pricing structure. Of course, once they choose a provider to produce a chip, it will be a "Design Win" to the provider.

Nowadays, a large customer, such as Nortel, seldom locks itself into one provider to do all the design work. It is a typical diversification strategy to reduce risk. That is why even with 100M dollars quarterly revenue at SEMILINK, none of the key customers account for more than 15 percent of the revenue during the past few years.

Finally, on the plus side for fabless suppliers, once a supplier gets the "Design Win" and product development starts, the customer is more or less locked into that particular joint effort. If it switches provider at this point, it will incur costs due to the delay of product releases, loss of customers, and forgone investments that will have a negative impact on the revenue. Hence, the chip supplier has higher bargaining power.

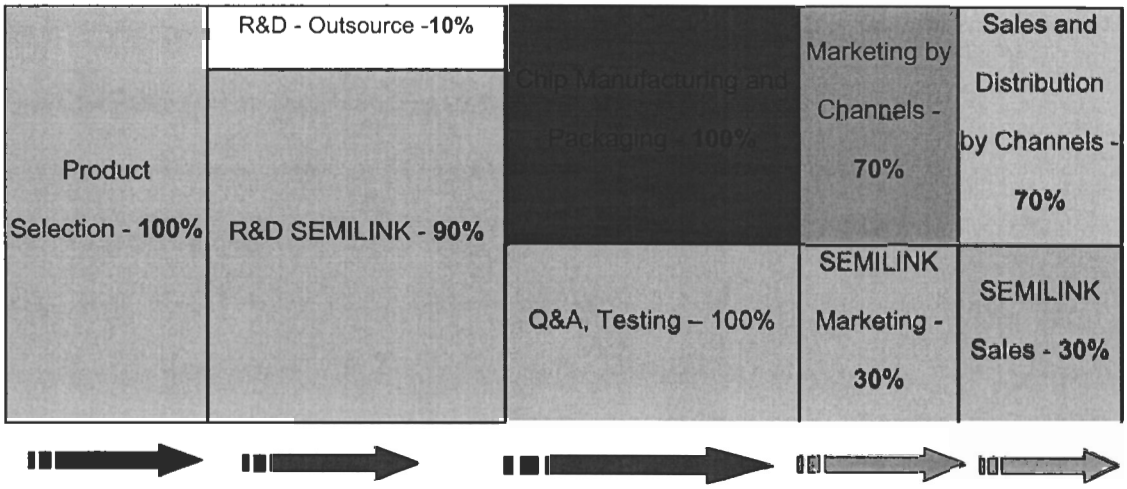
In summary, the bargaining power from customers drives the cost or price down for IC designers or firms. Customers are price-takers who, in turn, require the design house to be cost-based providers. Running on a well-managed cost structure is critical for SEMILINK to survive the competition.

2.2 Industry Value Chain Analysis

This analysis tool is another way of identifying similar Key Success Factors derived from the previously used Porter's 5F tool.

As illustrated below in Table 2.2, fabless industry value chain has five phases. Within each box, green represents SEMILINK's involvement in the specific amount of activity. Typically, for example, in the Product Selection stage, SEMILINK is responsible for 100 percent of the activity. Those five steps are Product Selection, R&D, Manufacturing, Marketing and Sales/Distribution. A more detailed explanation will follow for each of the individual areas.

Table 2.2 Industry Value Chain Chart (Fabless Design Firms):



Adapted from

Bukszar(2006)

Legend: Green as SEMILINK conducted activities. All other colours represent outsourced operations.

Product Selection:

It is one of the most important stages in the entire value adding processes for the companies who operate in the fabless industry. It dictates the direction where the design and production effort is heading, and where the millions of dollars will be invested. The company typically looks at industry trends, market direction, company-specific product portfolio, as well as firm business strategies to make decisions based on those factors.

SEMILINK keeps the product selection process entirely in house. As well, SEMILINK uses Product Planning (PP) meetings as the platform for the various processes. First, the marketing department gathers the potential requirements by communicating with customers. Together with the Letter of Intent from the customer, and a commitment of Non Recurring Engineering (NRE) cost, a feasibility study is conducted against company goals and product portfolio. Once completed, the report will be presented at a PP meeting that takes place once every quarter. There will be senior members including the CEO, and technical experts from all areas, in the meeting, debating and scrutinizing of the concepts. The plan will go through similar meetings for two to three quarters until the final decision is made. NRE from a customer is necessary to have the prerequisite for any chip plan approved. NRE ranges from 100,000 dollars to half a million dollars depending on the project.

Product Selection dictates a firm's future product mix, which is one of the KSF that affects overall business competitiveness (This also was identified and confirmed under barriers & substitutes in the Five-Forces model).

R&D:

After the selection of a particular product, the R&D product development stage commences. It involves the assembling of the development team, R&D planning, project

management, actual development (coding) and finally Tape-Out. The R&D competence and work quality is a true test of technical expertise and management capabilities.

SEMILINK engages in 90 percent of the product development. It is SEMILINK's core competency. In addition, in order to protect intellectual property (IP), the company keeps the majority of work in-house. SEMILINK is the leader in Communication Chip design with key customers like Cisco, Lucent, Nortel and Huawei. SEMILINK delivers superior chip design quality and speed-to-market that meets large Original Equipment Maker (OEM) requirements. With Design Wins across the board at the heart of their communication core equipments, SEMILINK lives up to its reputation as a market leader in the field. However, in some cases, for larger projects a small portion of the R&D is outsourced to subcontractors. For example, SEMILINK recently contracted some of the Wireless design work to Wipro in. As illustrated, R&D adds the most value to the company's value chain.

R&D draws 45 percent of company revenue. Improving on the capital efficiency throughout the process is a key success factor for a company to compete effectively. Off-loading some of the design work to offices in Third World countries like China or India offers exciting potential to lower the R&D costs. This also was confirmed in both Threat of Entry and Bargaining Power of Customer using the previous tool.

Manufacturing/Q&A:

The next phase of the industry value chain is the manufacturing, Quality Assurance (Q&A) and testing. Most of fabless design companies have no substantive involvement in the process as it is capital intensive and it is not strategically important to the design firms. Large foundries like TSMC and Charters are the leading players in the foundry business. With specialization and economy of scale, the two companies deliver the products with the best quality and cost combined. Currently, Amkor and Signetics are the market leaders for packaging services.

SEMILINK does not operate in the manufacturing phase of the value chain to reduce the cost and to improve the focus on core competency. Instead, SEMILINK does 100 percent of Q&A and testing in-house. In order to maintain the highest quality standards, since shipping cost is significantly lower than R&D and manufacturing costs, SEMILINK brings back all the chips from Asian foundries for quality testing before sending them back to Asia for final packaging when all of their quality control issues are satisfied. As discussed earlier, outsource manufacturing activity is a true reflection of a strategic effort towards cost control, which is in-line with the firm's KSF.

Marketing/Sales:

The next step of the value chain is the marketing and sales of the products. Using sales and distribution channels are the standard practice for fabless companies who have limited resources.

One important point to note is that SEMILINK is classified as a differentiation firm. It is critical for the company to produce innovative products. However, as the market/industry evolves, customers are demanding better and more innovative products for the best possible price. With the limited scope of this paper, the discussion focuses more on the cost side.

2.3 Key Success Factors

As discussed in the 5F chart, all the forces tend to be moderate or stronger which suggests that the industry is difficult and not very attractive since the bubble burst in the year 2000. Under these conditions, firms tend to put great emphasis on the cost control, even in a differentiation industry. In the fiercely competitive Integrated Circuit (IC) design industry, following KSF is critically important to the company's success and long-term survival.

Robust Cost Structure:

As clearly analyzed in the firm's R&D, Manufacturing and Marketing/Sales processes, a solid cost structure is very helpful to a company's success. The semiconductor industry is a capital-intensive industry. Fierce competition amongst rivals gives the customers strong bargaining power. All business consumers are price sensitive. Demand is quite elastic when price is considered. It forces all fabless IC firms to operate consistently on a razor

thin profit margin. Hence, cost control level could easily swing a firm from profit to loss, and vice versa.

Cost management is no easy task. First, production cost is quite significant in the cost picture across the semiconductor industry. Outsourcing is the trend and standard practice amongst fabless IC design firms. By doing so, a company could achieve the most competitive prices and maintain the highest possible standard at the same time. Whichever company could manage the relation well with the foundry, obtain a good price for the production, and secure enough wafer during good times usually gets a head start in the cost management race.

R&D cost is the other half of the picture. Selecting the right products for the limited R&D dollars is an extremely challenging task. Plus, finding the right balance between goods and services costs and R&D investment dollars based on current and long range economic situations requires a great deal of vision and judgment. Intelligently reducing the R&D dollars could have a very positive impact on a company's bottom-line.

Outsourcing production is a common practice amongst fabless companies. Firms will find it difficult to lower production cost control dramatically and turn it into a strong competitive advantage. Although each company individually manages its own R&D processes, innovatively improving it could well turn into a competitive advantage. As of this writing, no fabless companies have implemented large-scale offshore R&D centres

for cost reduction. Hence, choosing to do so first would provide SEMILINK with a great opportunity.

Product Mix/Portfolio:

A firm's product position in the industry and market place is yet another critical factor. Without the right products or chips in the right, potentially growing, and large enough market, even the best-managed company with a superior cost structure will have a difficult time surviving.

Using Internet technology as an example, in 2000 at the peak of the Internet, market driven technology pushed companies, such as SEMILINK, AMCC, Broadcom and Vitesse, which had the right products at the right time, to reach their peaks of revenue and profitability. However, when the market demands disappeared in 2001, most of the aforementioned companies lost because their products were no longer in need.

Broadcom is one exception, since it had a very diverse product mix and thereby managed to ride out the economic storm by relying on its consumer access products in its portfolio.

Emerging Market Penetration

As highlighted in the Threat of Substitute examination, while the market is mature and getting more competitive, firms should look elsewhere for growth. Globalization brings people and cultures closer together. At the same time, it also brings opportunities and

businesses closer. Firms should be open-minded about offshore business opportunities, and take the first-mover advantage.

Newer emerging markets have two unique aspects. Firms could expand their sales into other markets like China and India to access the huge markets and position themselves for further penetration. Secondly, companies could utilize emerging markets much cheaper labour force to lower overall cost structure so to achieve better profitability. China's Offshore Design Centre strategy takes advantage of both.

2.4 Rivalry and Competitive Analysis

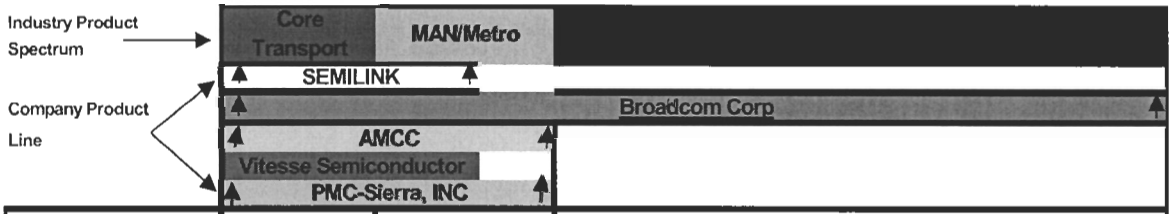
In this section, the paper will analyze SEMILINK's direct competitors to identify their history, product mix, and strategy and business strength. These competitors will be compared with SEMILINK in terms of their general abilities to achieve the industry KSFs. SEMILINK competes with companies like Broadcom, Applied Micro Circuit Corporation and Vitesse Semiconductor. As illustrated below, many companies compete in different segments of the network spectrum. Each firm maintains its own competence and diversification strategy.

Table 2.3 illustrates the Industry Product Spectrum that starts from left Core Transport to the right of User Access. In addition, on the following chart, five competing companies

product lines within the Industry Product Spectrum are shown. Take SEMILINK for example, the firm operates in the Core Transport, and some of the MAN/Metro segments.

The bottom half of Table 2.3 shows some key technology and business characteristics. As well, it demonstrates differences between the three areas of the Industry Product Spectrum: Core Transport; MAN/Metro and User Access. For instance, with the Geographical Area characteristic, Core Transport technology products have the capacity to carry data/voice over very long distances, such as crossing the country, whereas MAN/Metro products only focus on citywide traffic delivery. Finally, User Access products move the traffic into local premises such as residences and/or business locations.

Table 2.3 Product Distribution Comparison Chart



Typical Technology	SONNET	*SONET/DLAM*	*DSL/Cable Modem*
Geographical Area	Across Country	*Across City*	*Local home and business use*
Voice/Data Speed	Ultra High (10,000 Mbps)	*Medium High (1000 Mbps)*	*Usually at 2-6 Mbps*
Capital Investment	Ultra High	*Medium High*	*Reasonably small*
User Volume	Small (Large ISP)	*Larger*	*Extremely large with all home users and small businesses*
Gross Margin	Very High (75% up)	*Medium High (50-60%)*	*Very low at 40%*
Technology Sophistication	Extremely High	*Very High*	*Rather low*

Broadcom Corporation:

(Ref: Yahoo, Finance) Broadcom Corporation provides semiconductors for both wired and wireless communications. Its products enable the delivery of voice, video, data, and multimedia to and throughout the home, the office, and the mobile environment. The company provides portfolio of system-on-a-chip and software solutions to manufacturers of computing and networking equipment, digital entertainment and broadband access products, and mobile devices. It offers solutions for digital cable, satellite, and Internet protocol set-top boxes; high definition television; cable and digital subscriber line modems, and residential gateways; high definition DVD players and personal video recording devices; wireless and personal area networking; transmission and switching for local, metropolitan, wide area, and storage networking; home and wireless networking; cellular and terrestrial wireless communications; voice over Internet protocol gateway and telephony systems; broadband network and security processors; and system I/O server solutions. The company markets and sells its products in the United States through a direct sales force, distributors, and manufacturers representatives, as well as through regional offices internationally. Broadcom was co-founded by Henry T. Nicholas III and Henry Samueli in 1991. The company headquartered in Irvine, California.

(Source: Broadcom, 2005, p.1)

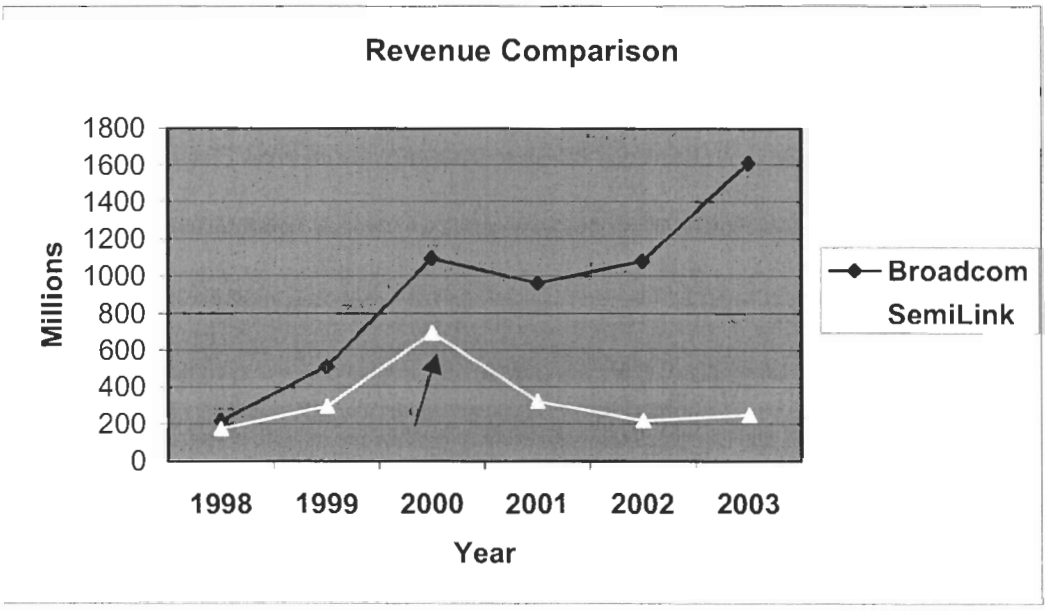
Broadcom competes directly with SEMILINK in the Core Transport and MAN/Metro segments. It engages in the full spectrum of products. It is a very good example of a company that has product diversification.

Broadcom's business areas could be divided into three key segments. First, cable modem/DSL enables convergence of home data, voice and home entertainment/video into one triple-play unit. Second, the firm offers enterprise high-speed LAN switch solutions to corporate customers in various forms of 10/100/1000/10000 Ethernet access ports. Both of the businesses focus on the access level of the Telecom industry. Third, they also offer VoIP and networking storage solutions that are emerging markets for home and business units. In addition, Broadcom is also a Telecom or communication device provider in that it provides chips to Telecom providers who build core fiber optic networks across large geographic locations to transport voice and data, such as long distance calls and Internet traffic. Although this portion is rather small in terms of revenue generated, and compared with the core business, it does make Broadcom an end-to-end full spectrum service provider.

As the table above indicates, Broadcom operates primarily in the User Access segment of the broadband technology. The firm serves a large number of customers with products of rather low gross margin. Although they have solutions in the Core Transport and MAN/Metro areas, the revenue portion is relatively small. When the Internet bubble burst, and the business downturn hit in 2000, the capital intensive Core Switching

segment was affected the most as demands dropped sharply. However, the User Access end of the broadband Industry did not suffer to the same extent as it was partly driven by the strong DSL/cable deployment in Asia; particularly in China. Moreover, Broadcom's product mix helped to weather the storm quite well with limited exposure to the Core Switching area. It allowed the company to have the opportunity to regroup and to re-strengthen existing business. Here is the comparison of Broadcom's revenue to SEMI Link's during the recession from 1998-2003.

Figure 2.1 Revenue Comparisons between Broadcom and SEMILINK



As Broadcom's revenue stabilized between 2000 and 2001, the company pressed on with the strategy of expansion and diversification. The firm acquired twelve other companies in 1999. When other companies were scrambling to survive by lay-off staff to cut costs, this particular firm saw opportunities to increase its market share, and to get itself in an

even better position for future growth. Broadcom took the time to properly integrate the acquired firms into its operation and to ensure that the true value was realized by generating synergy across the board. On top of that, more R&D dollars were spent on the emerging market. The effort bore fruit in 2002, as 20 percent of the overall revenue in the fourth quarter came from emerging markets and technology (Broadcom, 2002).

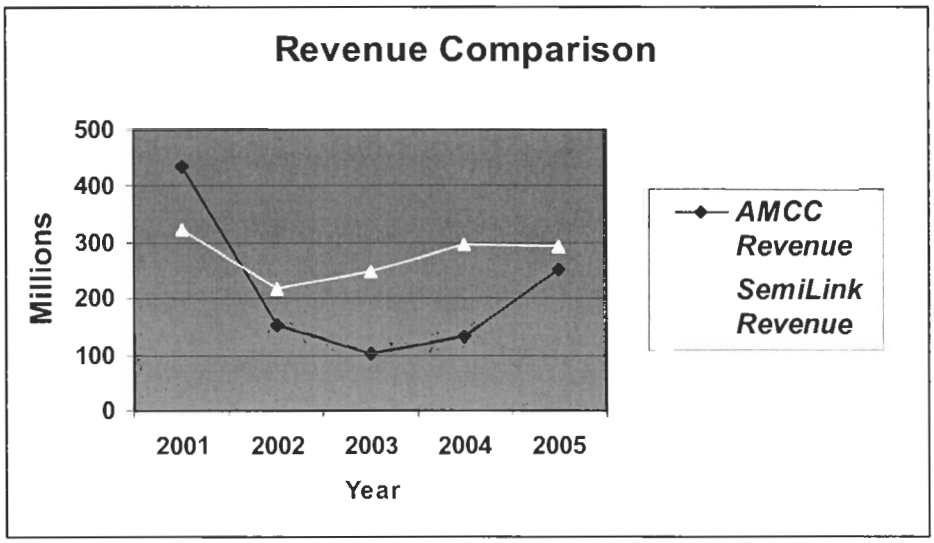
AMCC Corporation

> AMCC provides the essential building blocks for the processing, moving and storing of information worldwide. AMCC is a global leader in network and embedded PowerPC processing, optical transport and storage solutions. Our products enable the development of converged IP-based networks offering high-speed secure data, high-definition video and high-quality voice for carrier, metropolitan, access and enterprise applications. AMCC provides networking equipment vendors with industry-leading network and communications processing, Ethernet, SONET and switch fabric solutions. AMCC is also the leading vendor of high-port count SATA RAID controllers enabling low-cost, high-performance, high-capacity storage. AMCC's corporate headquarters are located in Sunnyvale, California. Sales and engineering offices are located throughout the world.
>
> (Source: AMCC, 2005, p.1)

AMCC was one of the main companies directly competing with SEMILINK. Over the years, the company evolved from a communications only firm, into a more diverse portfolio with storage as the second key areas of development. AMCC acquired PowerPC from IBM and 3Ware in 2004-2005. It was a strong sign of its resolve to expand into newer markets.

Traditionally, the company focuses on the Transport or Core Switching segment of the broadband market. It was the segment worst hit during the economic downturn in the 1990s. Since then, the revenue has not seen any significant rebound as the entire industry became over-supplied with lesser demand. Here is the revenue comparison between AMCC and SEMILINK:

Figure 2.2 Revenue Comparisons between AMCC and SEMILINK



In 2003, AMCC closed their manufacturing facility, or foundry, in an effort to reduce its operating expenditures. As discussed earlier, a foundry is a huge cost drain to the company when underutilized. After the shutdown, AMCC became a true fabless company exclusively focusing on design. In 2005, AMCC also saw its long serving CEO Dave Rickley stepped down. He served as AMCC's CEO between 1996 and2005 (AMCC, 2005 Annual Report).

In 2005, AMCC implemented the following strategies as their core focus: (AMCC, 2005)

- Drive Operational Excellence
- Maintain Customer-Driven Focus
- Foster a Culture of Accountability
- Strategically Expand Product Portfolio

Vitesse Semiconductor

Vitesse Semiconductor Corporation engages in the design, development, manufacturing, and marketing of integrated circuits (ICs) for systems' manufacturers in the communications and storage industries. The company provides laser drivers, transimpedance amplifiers, and post amplifiers that serve as the physical connection to the fiber optic cable. It offers physical layer devices that convert high-speed analog signals from the physical media devices to digital signals; and involve in clock and data regeneration, and multiplexing/demultiplexing for the fiber channel and gigabit Ethernet markets. The company provides network processors; software-programmable microprocessors for networking and communications functions, such as classification, filtering, policing, grooming, forwarding, and routing; and traffic management ICs that reside on a line card between the network processor and the switch fabric, as well as perform the policing, queuing, and buffering functions. It also offers switches for receiving data from a line card and routing it to its proper destination; enterprise local area network (LAN) products, such as transceivers, switches, and media access controllers that address gigabit Ethernet applications in the LAN; and storage and serial backplane products, such as serialisers and deserialisers, transceivers, retimers, and port bypass circuits, as well as switches, expanders, enclosure management devices, and RAID controllers. The company

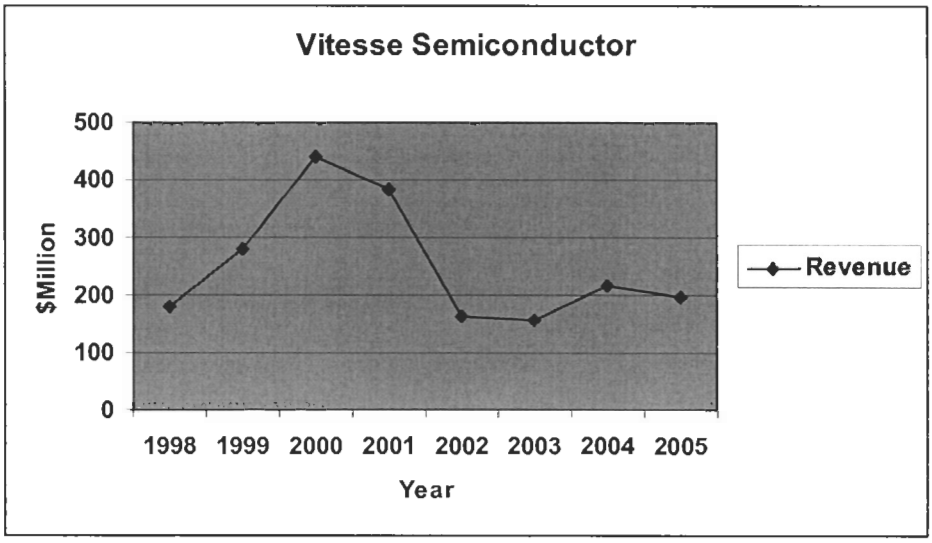
markets its product in the United States, Japan, Canada, Singapore, Hong Kong, and the United Kingdom. Vitesse Semiconductor was co-founded as Vitesse Electronics Corporation in 1984 by Louis Tomasetta and changed its name to Vitesse Semiconductor Corporation in 1987. The company is headquartered in Camarillo, California.

(Source: Yahoo, Finance, 2006)

Vitesse was again another key player in the Core Switching industry segment. The company experienced similar explosive growth before 2000. In addition, by the same token, Vitesse suffered significant losses when the recession hit shortly thereafter. Vitesse's annual revenue dropped from $400M range to $150M in about a year or so. Dramatic decreases were attributable to both a sharp decline in demands and excessive inventory of the customers.

Since 2001, the company has implemented a diversification strategy away from the pure Telecom play. As well as securing existing business to the carriers and service providers, the firm switched significant resources to LAN and Storage area that are lower margin and very high volume. By the end of 2003, Vitesse had 52 percent of its revenue coming from the Metro and Storage business. Without the alternation of the strategy, the situation would have been much worse by 2004. Here is the revenue figure:

Figure 2.3 Vitesse Revenue Trend



At the mean time, Vitesse went through some drastic measures of cost cutting. One of the key steps was to close the fabrication facility in Colorado to reduce the manufacturing cost and to re-focus on the core design competencies. All wafer production work has since then been outsourced to Taiwan Semiconductor Manufacturing Co, IBM and UMC. Similarly, assembly, packaging and testing were also subsequently outsourced to the specialized companies through United States and Asia. During 2000 to 2003, the company laid off significant portion of its work force and cancelled numerous large projects.

As of 2005, Vitesse's corporate strategy could be summarized as consisting of two approaches. First, the company will invest in specific areas of communication and storage where above average potential growth is promised. Second, the company was to focus on applications where there is a market or technology break point that shifts the balance of

power from incumbent suppliers, enabling large market share changes (Vitesse, 2004, page 2). Other strategies include:

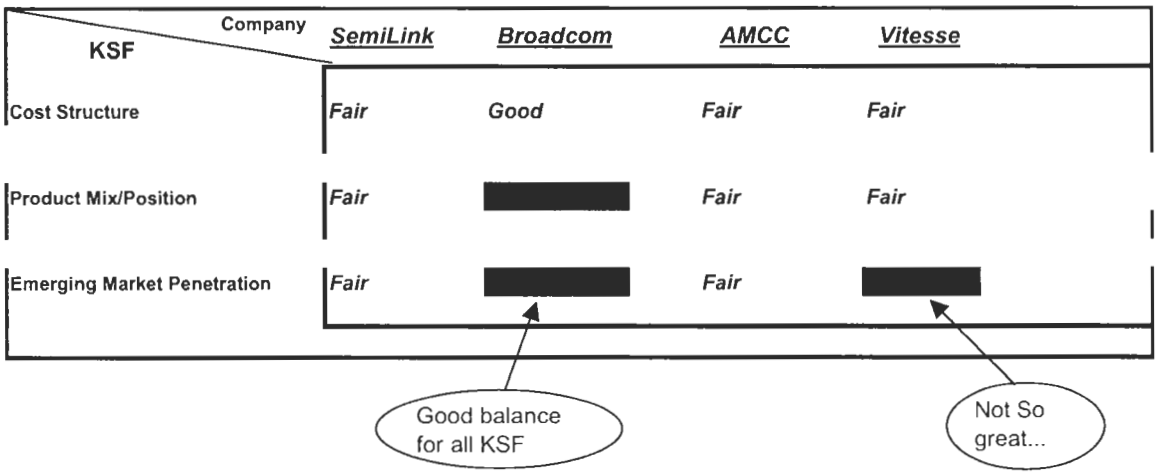
- ✓ Target Growing Markets
- ✓ Leverage Technology into New Applications
- ✓ Take Advantage of Technological Break Points to Address New Applications
- ✓ Provide Complete Solutions

2.5 KSF comparison among competitors

In this section, the KSF model will be utilized for a comparison among SEMILINK's key competitors in an effort to find out why some competitors are prospering while others are doing poorly. By doing the comparison, strategic alternatives can be examined.

Please refer to the following chart for the comparison:

Table 2.4 KSF Comparisons among Competitors



Of the four companies listed, it shows clearly that Broadcom stands out as the overall winner when all aspects are considered. Broadcom scored the highest in terms of Product Mix and Emerging Market Penetration. The firm is positioned very well to handle the industry downturn during the 2000 period with its diverse portfolio. As they were profitable for many years in a row, the company has a very strong balance sheet with close to two billion dollars in cash, or equivalent, and no long-term debt. It provides further opportunities for future acquisitions, thereby strengthening the firm's dominant position in the industry. Finally, Broadcom did a great job in Emerging Market Penetration. They were one of the early companies who entered the Chinese market. Since then, they secured their position in China and built solid relations with major Chinese vendors like Huawei and ZTE.

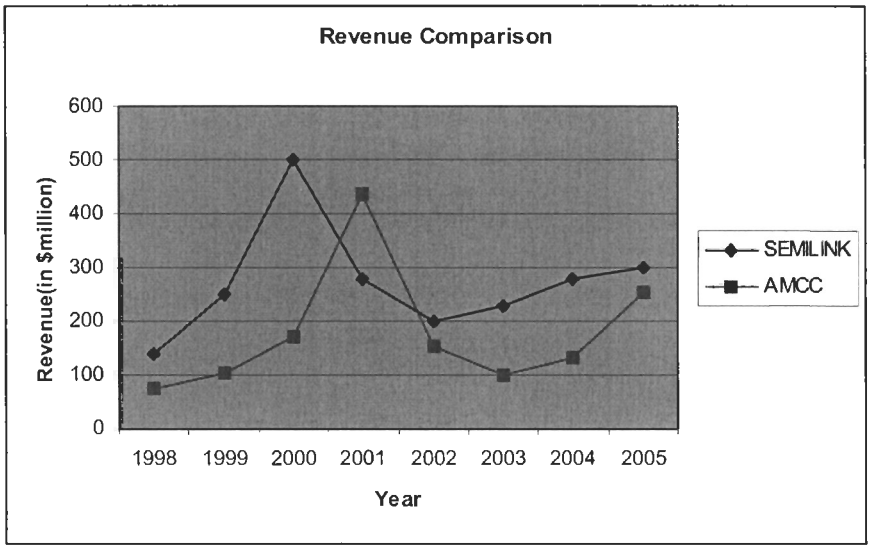
Broadcom also did a reasonably good job on cost control when compared with other firms. That puts Broadcom further into the lead with model profitability.

On the other hand, Vitesse did a rather poor job in managing the Product mix. They had very narrow product lines in the Transport segment that happened to be a declining industry. Although the company tried to diversify its product portfolio, the pace was not up to the necessary speed required for a rapidly changing market. Together with the fair cost structure, the firm has run a loss since 2001. Limited resources on the balance sheet prevented Vitesse from aggressively introducing new projects, or acquiring new technologies to expand its product portfolio. It had to carry long-term debt to keep the firm afloat. Lastly, facing strong competition from larger rivals like Broadcom in the domestic market, the company did not explore other emerging markets fast enough to gain offshore market share and other competitive advantages.

Somewhere in between the two extreme cases of Broadcom and Vitesse, SEMILINK and AMCC performed fairly well in some areas, but poorly in others. Overall, these companies had similar, but mixed results.

Here is the revenue picture of the companies. Striking similarity can be observed. All companies suffered large losses during the 2000-2001 period due to poor product positions. None of the companies fully recovered to their pre-bubble revenue levels.

Figure 2.4 Revenue Comparisons among Competitors



In summary, companies should have the right product portfolio in the right market at the right time. Diversification is important to drive long-term growth in both good times and bad. In order for an IC fabless company to be successful, maintaining a solid and robust cost structure is the key for maximum profitability particularly in tough times. In business, one dollar saved is one dollar earned. Managing a well-balanced financial business is critical. Lastly, CEOs should always look out for new opportunities in an emerging market, and try to be a first mover whenever possible.

SEMILINK should seize the opportunity immediately by exploring a way to dramatically reduce the cost per design, and to be the cost leader within the competition while maintaining a differentiation edge. At the same time, SEMILINK should leverage the cost advantage gained, and improve the product mix as well, so to advance into newer markets. If competitors move first, it will be the greater threat going forward.

Broadcom threatens SEMILINK on all three factors that might explain why their financial performance is so much better (Figure 2.1). SEMILINK's potential China strategy would help the company to catch up with the emerging market and provide a viable advantage in terms of the cost structure. In addition, the China strategy is an opportunity that the other three companies, especially Vitesse, will not have in the emerging market.

2.6 Strategic Alternative

Based on the discussion above, SEMILINK should take the following strategic steps to improve its current business operation:

Offshore R&D center in China (Shanghai) to fundamentally improve cost

An examination of all the companies analyzed revealed that none of the companies has large-scale design centers offshore. Hence, it should be an opportunity for SEMILINK to capitalize on an advantage that its competitors do not have.

Cost Saving Analysis:

A typical senior Electrical Engineer hired in Canada costs on average a salary of C$110,000 annually. A similar engineer in China costs C$30,000. So, let us assume the following costs are proportional to the annual salary (mostly locally acquired) such as

Employee Benefits, Office Space Rental, Utility, Furniture and R&D Expenses.

We are looking at a gross saving of 73 percent on R&D costs. Let us further budget the extra cost overheads needed to manage the local workforce in terms of sending team leaders and managers to help in the initial ramp-up period, and the time required to bring the local employees up to speed. Amortize all the costs out for a period of 10 years. Add another 20 percent overhead on top of the initial 27 percent.

We come to a final savings of about 53 percent. That is to say we could comfortably expect 53 percent R&D cost-saving in the long run with confidence. Put the concept into dollars. Even if a quarter of the workforce could be relocated, on an annualized total R&D budget of $120M R&D, we could see savings of $16M. If we keep the same R&D budget, then we could have 14 percent more projects at the same time. This is the cost saving KSF, and the improvement in product mix KSF.

Another way to look at this: $16M saving on R&D cost will translate into a net income of $12M after tax. With 210M outstanding shares, it is 6c per share annually and that is quite a respectable number.

As the company grows, more design work can be moved to China. More savings can be realized. Most importantly, the strategy brings significant competitive advantage as it has great potential to increase SEMILINK's financial strength.

Future Revenue Opportunities

Similar to other high tech companies who are going through the same belt-tightening process, SEMILINK is struggling with a limited budget for R&D. It had to cancel many projects halfway through, often due to limited resources in the short term, and limited visibility in the future. Fourteen percent more projects certainly would give SEMILINK a competitive advantage over other companies who have not yet implemented a similar strategy. In addition, the extra capital could fund longer-term strategic projects crucial to SEMILINK's long-term growth and much needed competitiveness.

Due to some extreme visibility limitations into future technology trends and market directions, taking on multiple paths is strategically important for the company's long-term survival and prosperity. Strategically selecting projects while focusing on long-term technology developments is essential and challenging for senior management. Additional capital for extra selections will clearly make the tasks easier.

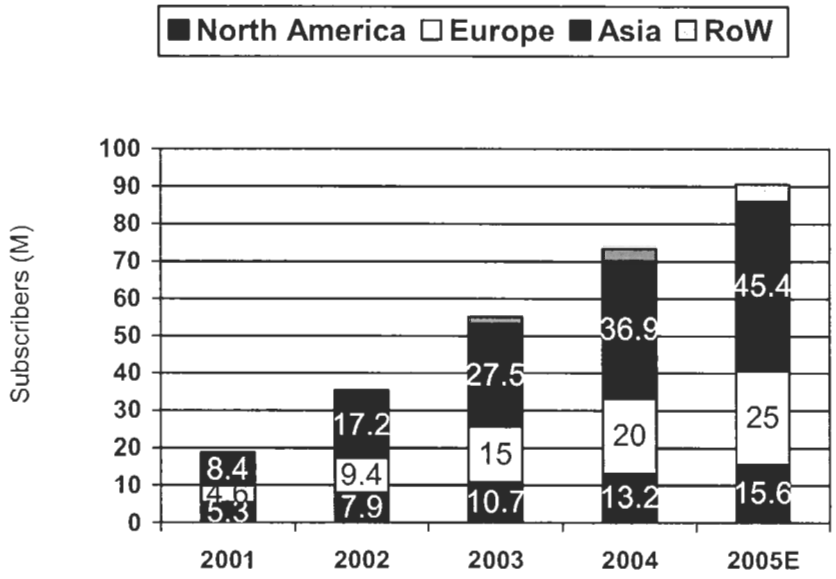
WHY CHINA?

By going to China, SEMILINK could achieve better cost (KSF), get access to one of the largest emerging markets (KSF), and maintain product differentiation at the same time.

Fast Growing:

One of the key areas that drive the growth is the DSL subscriber. It is a key indicator on how the telecom sector performs. DSL itself not only drives the local provider's growth at the edge, but also drives the infrastructure growth in the core. It also proves to be one of the biggest Emerging Markets (KSF). Here is a look at Digital Subscriber's Line (DSL) volumes. It clearly shows that Asia is the leading player.

Figure 2.5 DSL Market Size Trend



Source: USB Warburg LLC,Feb 25, 03)

Closer to Customer:

In continuation of the first point, China has the largest customer base and has the potential to grow a lot bigger and a lot more quickly. Having the design centers closer to the customer will improve communication, efficiency and overall customer satisfaction.

Moreover, because of its ideal location, it is closer to all other major customers from the other Asian countries.

Closer to Manufactory facility:

Being able to locally design, locally manufacture, and locally distribute/sell is a huge advantage on its own. China has been quickly developing to be the manufacturing base for many products including semiconductor foundries and fabrication labs. Having workers closer to the factory will make the product revision, product validation and production sales much easier and convenient. Logistically it makes tremendous sense.

Cheapest to Operate:

For all of the Asian countries from which SEMILINK has put revenue into, China is the most cost effective region to operate large scale R&D. Unlike Japan, India, Taiwan and Singapore, with all the other major advantages listed above, China is a natural choice for Asian Design Centers.

Had Local Experience Already:

In China, SEMILINK already has three sales offices. More offices than all the other Asian countries combined. Shanghai is the largest offshore office with strong sales and tech support capability. Already, solid local knowledge has been obtained. On top of that, it already has built the critically important "relationship" with local government and businesses that are key players in Chinese society. It should pave the way for future expansion with the best conditions and implementation ease.

Better Business Environment and Demand:

In 2003, Chinese manufacturers can only supply 1/5 of the total local demand (mostly consumer products such as DVD players). Thus, the Chinese government is encouraging the semiconductor supply chain to enter the Chinese market with the following

incentives: Value added tax would be reduced from 17 percent to 3 percent for those devices initiated in China; new semiconductor design enterprises will enjoy a tax-exempt status for the first two profitable years (a 50 percent reduction in the following 3 years).

Shanghai – Rising Eastern Silicon Valley

Shanghai injected a total of 450bn yuan into its industry between 2001 and2005. This includes putting 150bn yuan in an IT industrial undertaking, plus an investment amount of 70-75bn yuan for integrated circuit industry, as is known from a Symposium on Integrated Circuit Industry Development held in Shanghai. Clearly, all signs indicate that Shanghai is quickly becoming the Silicon Valley of the Far East.

To raise the quality and overall competitiveness of Shanghai's IT industry, efforts are being made to follow closely international trends and, according to market demands, focus on the seven categories of products as integrated circuit, telecom, computer and Internet, electronic vacuum devices, new electronic components video and audio, and software. In the long run, the IT industry will help Shanghai to become the biggest center for integrated circuit designing, production, sealing and packaging, which will be run with a large array of components and have the largest amount of products exported.

A series of strong measures were adopted to boost Shanghai's IT industry. First came the development of specialized integrated circuit designing and production. By 2005, over

100 large designing corporate establishments were built according to advanced standards. Second, 40 percent of chips will be self-reliantly produced to satisfy the country's demand for national security, economic construction and social stability. Third, a rational industrial structure is to be developed. The priority will be placed on the expansion of existing industrial parks, and the construction of a large production base for integrated circuits concentrating on Zhangjiang Hi-tech Park. Along with a sealing and packaging base in Jinqiao, Songjian Export Processing Zone and Nanhui IT Developing Zone, a designing base also will be built centering on Zhangjiang and Caohejing Hi-tech Parks.

Risks Associated with China Option:

Political stability has long been the concern with investment in China. Although, since the early 1990s implementation of Deng's "open door" policy, the Chinese government has been determined to create a stable and friendly business environment for both the foreign enterprises as well as local firms, there is still some uncertainty over Communist China's one party political system. The concern becomes the worst hurdle for foreign investments to enter the country.

Economic stability is another key issue that affects the investment appetite of foreign firms. In a centrally controlled free market and free economic system, there was no previous economic model or experience to compare to. Does the economy follow the same path in China as in Brazil, Russia or another path unprecedented? One good example of unexplained economic phenomena between 2000 and 2005 in China was that the high growth rate economy accompanied a high deflation rate.

Intellectual Property (IP) has been a notorious issue in China. As the country tries to catch up on technology and the very latest product innovations, it often takes the approach of copying and "Reverse Engineering" many products. In SEMILINK's case, the issue is not as bad as it seems. First, the R&D center in China does not sell to local customers directly. It purely operates to take advantage of lower local labor costs and the vast human resources pool that is available to it. Further, the majority of sales and direct communication with customers remains funneled through local sales forces that have existed for many years. Second, in terms of internal stealing of information and IP by Chinese workers, there is an access protection system already in place throughout the company. IP developed locally in China may specifically face some added risk. In that case, SEMILINK should take extra precautions to manage the IP well in ways such as having a IP policy or tougher computer security.

Joint Venture or Wholly Owned is another sticky issue. Back in late 1990s, the Chinese government required foreign investment to be Joint Venture based so that Chinese firms could learn from the venture, play catch-up and eventually share the profits. The regulation makes the IP protection almost impossible. Today, Foreign Direct Investment can, in fact, be a wholly owned entity. Hence, SEMILINK's R&D center in China should take full advantage of this business opportunity.

Why China not India?

First, the size of China's economy in terms of GDP and potential market size is larger than those emerging markets in India and Brazil combined. Foreseeable sustainable economic growth rates in China are higher than in neighboring countries. Second, Indian government policy and preferences in terms of foreign businesses and investments gaining access to India's huge pool of highly trained and relatively inexpensive workforce are more restricted than China's policies. Thirdly, China's current infrastructure, including financial, transportation and others, is clearly superior to India's in many ways. As well, China is becoming more mature and capable of handling larger and longer-term foreign investments.

Also listed below are some other comparisons between these two countries:

Education and talent pool:

China is superior to India with respect to human resources. India has long been suffering from a "brain-drain" to the US for advanced degree holders. Although India has a first-rate education system, and enjoys very high standards of education throughout all levels, most masters and PHD degree seekers ended up relocating to the United States. On the other hand, China maintains a great pool of talent partially due to the US restrictions on Chinese students. Therefore, a large number of advanced degree holders remain inside the country. In addition to that, an increasing number of Chinese citizens who managed to

get advanced degrees abroad are returning to China for better job opportunities.

Openness and Infrastructure

China's newer generations are more receptive to Western technology and culture. The government is creating many favorable policies that SL senior management understands in the Chinese investment policies and in the regulatory environment. If this is a gap, how can it be addressed? In an effort to attract foreign investments and to help Chinese economic developments, China took specific action. Over the years of openness and aggressive build-out, China owns much better and more advanced infrastructure compared to India and other developing countries. It makes further and future investment from foreign firms much easier and practical.

Although, India does show some strength in the following areas:

Political Stability

The political system in China poses several potential issues. Many foreign investors and multinational firms view China's Communist totalitarian regime as not being conducive to the fundamental tenets of capitalism. In contrast, India's parliamentary democracy is much more conducive to capitalism and is much closer to the ones from western countries.

Language and culture

India is perceived to be the better choice in this case due to its language capability over China. English is one of the official languages in India. With a strong US influence, and other English-language influences such as the British (since India was a British colony until its independence in 1949), language and economy makes India much closer in culture to the Western world than China is. Less language barriers facilitate communication and management in business. Thus, because of these deficiencies, China in this case is an inferior choice.

In Summary, it is becoming clear that the opportunity for deployment of large scale R&D Design centres in Shanghai is becoming more practical in terms of talent pool, government policies and incentives, infrastructure, and market acceptance. Overall, China is a better choice than India in SEMILINK's case. Even with some risks involved, SEMILINK should take the necessary steps with resolve and swiftness to grab the chance that China offers.

3 INTERNAL ANALYSIS

In this section, the proposed strategic alternative will be mapped against three key internal areas: management preferences, organization and resources.

3.1 Management Preferences

In order to assess the strategy fit of a China Design Centre recommendation within Management Preferences, three important aspects are discussed as follows:

Senior Management Capability:

SEMILINK's CEO joined the company with a great deal of knowledge about the industry and a tremendous amount of technical background. His career started as an engineer in AT&T. He later became the director of Microelectronic Division before eventually joining SEMILINK in 1993.

SEMILINK's current COO and CTO are the founders of the company. They are also veterans of the IC design industry with in-depth technical expertise.

Managing a remote design centre, particularly in China, requires a different type of knowledge compared to managing simpler sales office setups. There are many specific

local cultures, political and business issues to be considered. A potential management capability gap would be:

- Senior management team including CEO, COO and CTO have no prior experience and knowledge with China design centre operations.

In order to close the gap, top management should consider the following options:

- ✓ Senior officers should put more focus and emphasis on Asian and China operations. Management should travel to China more often to meet with local officials and local office staff. Intermediary services such as the China Canada Business Council, Industry Canada and other private companies can be avail of to set up meetings with relevant senior officials. Note that sufficient notice must be given to arrange these meetings.

- ✓ In order to improve local knowledge and management, top management should consider including at least one China operations Vice President (VP) in the senior management team. Reporting directly to the CEO, the VP should proactively bring the entire senior management team up-to-date on project progress, significant local events, staff changes, local competitive landscape and recommended local strategies. He/she should also take initiatives on the latest corporate strategies for local implementation. As mentioned in the Human Resources Section (3.3.1), there are currently 15-20 senior Chinese staff members

in various management levels on file. A qualified candidate for the VP of Operations position may well be selected from this roster.

- ✓ The VP of Operations in China should be part of the decision-making process for choosing product direction in China's market. A well-informed decision with local knowledge goes a long way and stands better chance for success.

- ✓ Each of the senior members of the management team including the CEO, COO and CTO might consider rotating some of their working time in the China offices to get further exposure to the company's local operations. Spending extra time locally by participating in some of the local decision-making and implementation will be very beneficial.

Decision Making Criteria

SEMILINK has typically used Return On Investment or ROI as the key factor in decision making. Projects and spending are divided into two distinct types. One is operational related spending which are required to keep the business running on a daily basis. As long as they are valid, the costs get straightforward approval. The other is the project based or business improvement based expense. It goes through the standard ROI process.

Each project prepares a detailed financial projection either on revenue return on the investment or cost saving returns over a specific period.

China Design Centre Strategy project fits in the latter category where the short-term financial resources gap should be covered by long-term cost savings. Further discussions in the Resources Section (3.3) under the financial segment demonstrate how this gap can be potentially closed.

Apart from the potential standard cost saving, ROI with China Design Centre Strategy can be multi-dimensional due to the unique local business environment. As SEMILINK hires more people and invests more funds locally in the form of FDI, more government incentives in terms of tax breaks on local sales become available. This may also lead to favourable policies that will allow easy access to broader China markets and government businesses.

Productivity/Morale issue:

As the company aggressively pursues the plan of moving the design work to China, shifting of resources is warranted considering that limited resources are available in terms of head-count and operating expenses. This would mean lay-offs in the other facilities and the associated costs of doing so. Minimizing the impact on the overall morale of the employees poses a significant challenge to management.

This potential gap can be identified as:

- Productivity could be impacted due to morale issues as the company moves the design centre to China and closes its North American offices.

SEMILINK should consider the following steps to mitigate the negative productivity issue:

- ✓ Demonstrate strong commitment to the China design centre plan, especially by senior management. The China Strategy clearly improves the company's cost structure based on a strong ROI. This helps the company to be much more competitive while maintaining its technically innovative nature.

- ✓ Communicate well within the company the importance of the offshore design centre strategy in terms of significant cost savings and long-term benefit to the firm. Try to gain the buy-in from all employees.

- ✓ Continue the local North American Design centres. Gradually move design forces to China design centre through attritions from the North American offices. The China office should grow internal competencies and become a part of the company, and would thus protect IP to a greater degree.

- ✓ North America office could be closed over time with workers either re-assigned or reduced through attrition.

- ✓ Reassure all the employees that no layoff will occur throughout the company as the offshore design centre strategy is implemented.

In summary, three gaps have been identified as the China Design Centre Strategy is considered from Management Preferences point of view. They are Senior Management Capability, Decision Criteria and Productivity/Morale. Recommendations have been proposed accordingly to close the identified gaps.

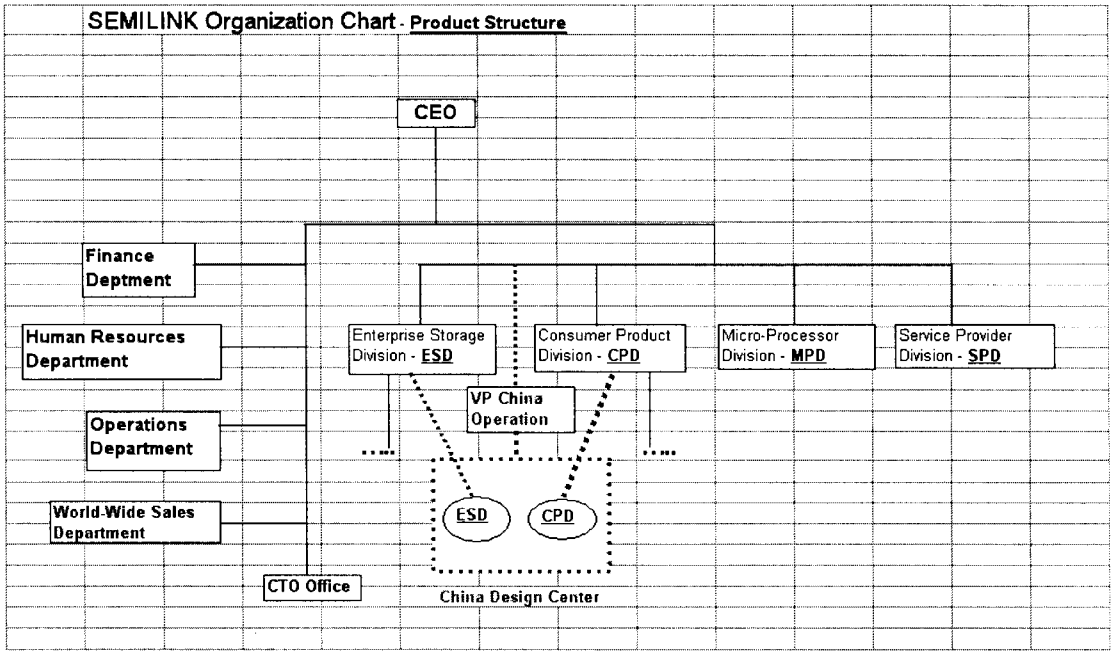
3.2 Organization

3.2.1 Organizational Structure

SEMILINK is clearly a Product Structure operated firm. As discussed earlier, the company's primary activity is R&D that comprises four key product lines: Enterprise, Service Provider, Consumer Access and Storage. The CEO is responsible for overseeing all four-product lines as well as other administrative functions such as Finance and Human Resources. Each product line has its own General Manager responsible for its own section of developments. Also, the CEO works reasonably close with key product groups in making sure key products are well developed and managed to the markets. At the mean time, the CEO also makes sure that enough exposure among all groups and

synergies are explored during the product planning and resources allocation. Refer to Figure 3.1 for the company's Organizational Structure. The section in black is the existing structure.

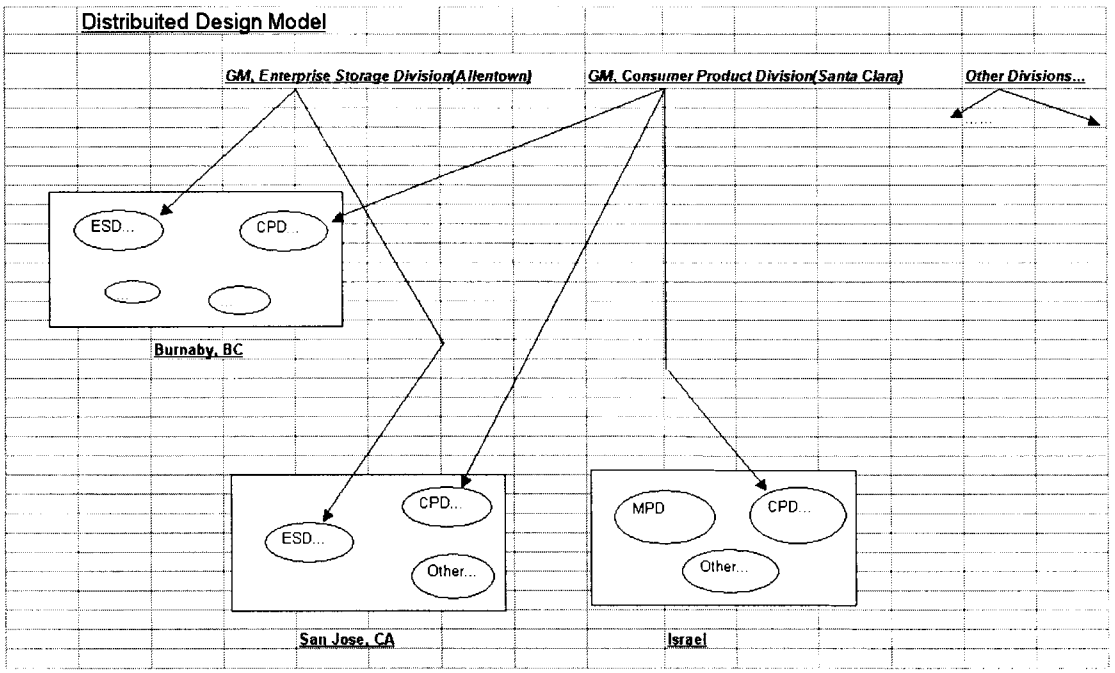
Figure 3.1 SEMILINK Organizational Chart



SEMILINK has been running centralized management and distributed design model for the past several years. One division can reside in many geographically diverse design centres. For instance, the General Manager for Enterprise Storage Division (ESD) is in Allentown, Pennsylvania while some of the product development teams are in the San Jose, California office. The site in Burnaby, BC also has teams of developer working under the division.

Similarly, Consumer Product Division (CPD)'s General Manager is in Santa Clara, California. His teams of product developers are distributed in Santa Clara, Burnaby and Israel. The distributed model allows maximum flexibility of grouping resources together to achieve the maximum results. With modern communication tools and network distributed computing power, the distributed design model proved to be both practical and effective. Refer to Figure 3.2 for further explanation.

Figure 3.2 Distributed Design Model



- Gap 1. SEMILINK had no experience in moving a design centre from North America to offshore. How to rearrange the current organizational chart to

integrate the China office strategy and to maximize cost and productivity performance is a key challenge.

As discussed earlier in the chapter, the best approach to move the design force to China is to gradually move human resources and redirect the new projects to the newly opened China office. To close the gap, here is the proposed solution:

- ✓ Create two similar ESD and CPD teams in the China office, reporting directly to General Managers of each division. See redline on Figure 3.1,

- ✓ Hire a VP of China Operations reporting directly to the CEO. The person must be based in the China office and must have extensive knowledge of the Chinese operation. Ideally, he/she should be a Chinese person with western education and management experience in a medium to large chip design organization, in a preferably similar industry to SEMILINK.

    - Gap 2. Currently, the general managers of the two divisions have no prior knowledge of managing Chinese teams of engineers.

In the previous sections, there are explicit discussions on how to close the gap for senior management team. Those solutions can also generally apply in this case. In addition, here are the steps that could be undertaken to reduce the gap even further:

- ✓ The General Managers for the ESD and CPD should put even more focus on the Chinese team management. The tasks of managing Chinese engineering teams are somewhat more hands-on than those of a senior management team. Moreover, the fact that both ESD and CPD's significant workforce are in China now, indicates its commitment to operate in China.

- ✓ Both GMs should travel more often to the local office to meet with local Chinese employees, to participate in critical staff hiring, attend critical project management meetings and to be involved more on local projects. This is especially crucial at the beginning stages.

- ✓ Both GMs should also work closely and consult frequently with the VP of China Operations for project management and critical product decisions to ensure they in-line with local culture, common practise and government regulations.

3.2.2 Systems

With respect to payroll, accounting and performance appraisal systems, there are some challenges that need to be addressed for China Design Centre Strategy. As a publicly traded company, SEMILINK has been operating under North American systems from the beginning. The company provides competitive packages for employees in terms of salary

and benefits. It regularly runs performance appraisals, both annually and quarterly, to assess employees' contributions and to award them accordingly.

Foreign companies that operate in China have to adhere to different local practises. For example, under the name of "building relation" or "guan xi", the firm pays for most of employee's taxi fare and meals as expenses. Lunch boxes are free, like coffee. Employees normally work very long hours with no overtime pay; however, they expect large bonuses at the end of the year. Employees are used to paying very low income tax, even those receiving higher salary. This means the firm has to cover a portion of the employees' income tax to remain competitive in the industry.

The system gap for setting up and running Chinese offices could be summarized as follows:

- The company has limited knowledge and lack of system support for setting up large engineering design operations in China in the areas of Payroll, Accounting, Performance Appraisal and Incentive systems.

The following actions are recommended to remedy the situation and to close the gap:

- ✓ Hire a local consulting firm to understand the current salary and benefit levels. This will help SEMILINK prepare a competitive remuneration package that will

attract the best talents. The benefits should include specific perks such as "entertainment" expenses.

- ✓ Adjust the current Payroll and Accounting Systems to incorporate those differences as a part of the company standard for China operations.

- ✓ Rely on local marketing research firms to provide detailed information on the common practises with which foreign firms in the same industry run their Performance Appraisal and Incentive Systems. Combine this with SEMILINK's corporate systems and come up with the best practises to cover operations in China and the rest of the world.

- ✓ Create a new standard in the current Performance Appraisal and Incentive systems to support the China operation in its own localized style.

- ✓ Hire a full time office manager who interfaces and liaisons with various local service providers including accounting, payroll, employee benefits and human resources. The role also should be the contact for local employees for those services.

3.2.3 Culture

In order to implement the China Strategy efficiently and effectively, there are two types of culture changes that the company has to deal with. Those are clear gaps that need to be narrowed.

The company should engage the following actions to close the gap:

- ✓ All employees should be convinced that SEMILINK will be a true multicultural company. Everyone should embrace the change of globalization and the modern-day business reality.

- ✓ Employees are encouraged to talk more frequently with the Chinese staff. When possible, North American staff should be given the opportunity to work at the China office to become familiar with the local culture, and even more importantly, people.

On the other hand, the employees in China may also experience culture shock in their own country because they will come across western management style and peers of foreign business background and a different work ethic. Although China has evolved in terms of globalization for many years now, there is still some "catch up" work that needs to be done. Hence, there is a culture gap from the local China Office's point of view:

- China Office staff has little knowledge about SEMILINK's corporate culture as well as the North American culture in general.

To close the gap in supporting the China Office Strategy:

- ✓ The VP of China Operations and the HR department should be actively involved in introducing the company culture in terms of management styles, existing systems and procedures, expectation and office environment.

- ✓ The GMs of each division and middle to senior management teams should visit the office more often initially to introduce themselves and the department, and to get along with local staff.

- ✓ Members of the Chinese design teams should also visit the North American offices when possible to see the company in person and be comfortable with their peers as they meet for product planning and project kick off meetings.

- ✓ As part of the career development process and incentives, selected Chinese staff should be given the opportunity to work at the North American Headquarters. This will also benefit the company in terms of improved cultural integration. The Chinese staff also can serve as resource persons when decisions on China have to be made at the Headquarters.

- ✓ The Human Resources and management team should proactively survey Chinese staff for their adaptation status and job satisfaction with the firm. Leaders on the other hand should monitor China employee's performance to determine if there are any culture related issues.

In summary, there were a number of gaps that have been discussed between the proposed China Strategy and internal profile in the areas of Organizational Structure, Systems and Corporate Culture. Potential solutions have been offered to close the gaps.

The next section will discuss resource gaps that the new strategy might encounter and the potential solutions to fix them.

3.3 Resources

3.3.1 Human Resources

The Human Resources challenge facing the China Design office plan is two-fold. One is to source adequate local talent in Shanghai, China to support the opening of the office and future expansion. The other is to arrange the attrition process throughout North American Design centres. Those gaps are:

- The company has no experience sourcing such a large pool of talent in China in a relatively short time. Moreover, there is the challenge of arranging enough experienced middle management team for the much needed knowledge transfer and management.

Here are some of the factors that will help in filling the gap.

- ✓ SEMILINK has three sales offices in China: Shanghai, Beijing and Shenzhen where Shanghai is the hub. Over the years, the offices have been serving local customers both in terms of pre-sales and after sales support. Some relationship or "guan xi" have already been established with both customers and local government agencies. "guanxi" also have been established with local service providers and vendors including recruiting firms, IT contractors and hardware resellers, interior decorators, builders, electrical contractors. Those are the valuable sources for the potential large-scale office expansion.

- ✓ Employee localization is underway. Most of the staff were locally raised Chinese with certain Western education backgrounds which can help to bridge the culture difference and language barriers. Furthermore, China currently has no shortage of very talented people with outstanding education and work experience. Shanghai and Zhujiang peninsula are the homes for some of China's most prestigious universities such as FuDan, Jiao Tong and Zhejiang. The design centre will have

more than enough human resources from a very large pool of local professionals to support SEMILINK's initial setup and future expansion.

To close the gap on selecting the right talent and knowledge transfer:

- ✓ The HR department should work with each of the engineering division, ESD and CPD, to prepare a most accurate list of local employee requirements.

- ✓ Using the "guanxi" already established, the HR department should fully utilize local professional recruiting agencies that SEMILINK has worked with, to access the large talent pool and to conduct the first round of screening.

- ✓ Again using "guanxi", some of the Chinese employees both local and in North America who graduated from those above-mentioned top schools could refer their classmates and alumni to be part of SEMILINK. They could also talk to the schools using their relationships and arrange on-campus interviews for talented new graduates.

- ✓ A joint task force should be formed from North America including HR experts, technical staff from ESD/CPD and decision making senior mangers. The team should be onsite in Shanghai to manage the hiring process.

- ✓ There will be a certain level of knowledge transfer needed to set up design flows and systems that are comparable to North American standards. SEMILINK has many experienced middle management and senior engineers who are native Chinese working in North America design centres. They are willing to relocate to China on a short term and long term basis to facilitate the transition.

Finally, with respect to properly managing attrition process, the HR department also plays an important role. The gap presented here is the fact that SEMILINK would like to keep the key technical talent as SEMILINK gradually moves design forces to China.

- ✓ One option for achieving the goal is through offering good competitive remuneration packages to those whom SEMILINK would like to keep. In the mean time, SEMILINK should offer to relocate them to other design centres of their choice including China if they are willing to do so.

3.3.2 Operational Resources

Operational resources are managed centrally by the COO office at SEMILINK. The office's primary focus is to ensure the smooth operation of manufacturing/production. Other duties include Quality Assurance, Product Validation, shipping and other administrative functions such as Information Technology and Facility, but not including Finance and HR but include IT and Facility. Most operation resources are located in

Burnaby where the head office is. All other design centres and offices have very limited involvement. Operating processes in other design centres are managed either remotely by Burnaby or by dispatched personnel from Burnaby. Overall, it is a top-down model.
In terms of Operating resources/processes gaps presented in setting up the China Design Office, they are summarized as follows:

- With limited knowledge of the design centre setup in China, huge differences in business environment and culture between North America and China, the challenges identified are: location selection, build-out management and initial IT configurations.

To tackle the gap, the following solutions are proposed:

- ✓ The VP of China Operations, a newly created role mentioned in the organizational structure discussion, should be leading the task of selecting the location of the facility or premise. His/her experience of local business knowledge and best practises will help in this case. He/She should work closely with a local known real estate agency to manage the process.

- ✓ SEMILINK should hire a local professional consultant and project management firm to conduct the office build-out. The VP of China Operations should lead in working out an office specification with the North America COO office and oversee the build-out procedures.

- ✓ Due to strict custom control and very long delay across the border, IT hardware would be best purchased locally. Detailed specifications of computer hardware should come from the Burnaby IT department to ensure compliance with the company standard in terms of future support. The VP of China Operations should coordinate the process such as local vendor selection, purchase and hardware delivery.

- ✓ IT staff from North America will be onsite to set up the standard computing environment for the office. While they are in China, the IT staff should take the time to source local IT support in the form of local contractors in the short term. In addition to that, the visiting IT staff will also need to coordinate with HR department as well as local people to hire permanent local IT staff.

- ✓ On top of that, onsite IT staff will also help on selecting local hardware vendors to secure the future channel for computer equipment purchases.

As the Chinese modernization process picks up speed, so do the standardization and globalization. In Shanghai alone, state-of-art "turn-key" facilities targeted specifically to semiconductor industries can be built to specifications with minimal foreign customer involvement. Very high speed dedicated Wide-Area-Network data connections could be

arranged within three months between North American cities and major Chinese cities. It makes the data communication possible between sites.

Refer to Table 3.1 for a sample of professionally prepared facility cost breakdown for setting up a design centre in Shanghai Pudong hi-tech park. The cost is based on fitting-out a three-floor building with 20,000 square feet to support up to 200-users R&D office On the IT resources front, refer to Table 3.2 for complete list of hardware that is required for a remote design centre to be in-line to SEMILINK's computer service standard. Again, the challenge is mainly on the delivery delay, as some hardware takes a lot longer to be available due to custom hold-ups even though the purchase was made through the local vendors.

Table 3.1 Shanghai Office Facility Setup Budget

Preliminary Budget			**27-Jun-06**
	Item		Amount (RMB)
	Summary:		
A	**General Fitting-out Works**		
1.0	Preliminary 准备工程		61,529
2.0	Demolition work 拆除工程		21,923
3.0	Partition and associated works 墙面工程		70,381
4.0	Door & hardware 门		108,374
5.0	Floor Treatment 地面工程 (no raised flooring)		490,009
6.0	Wall Treatment 墙身用料		64,631
7.0	Ceiling Work 天花工程		223,262
8.0	Custom made Furniture 固定家具		70,319
9.0	Miscellaneous 杂项		246,943
		total :	**1,357,371**
B	**Mechanical, Electrical, Fire service**		
10.0	Electrical works 电气部分		840,000
11.0	Mechanical HVAC 空调工程		1,177,840
12.0	Fire service works 消防工程 (no FM200)		305,000
13.0	Plumbing & Drainage system		91,001
		total :	**2,413,841**
C	**System furniture系统家具**		
14.0	System furniture系统家具		900,000
		total :	900,000

D	**Others**		
15.0	IT conduiting & cabling works (IT equipment exclude)		356,765
16.0	Security system门禁及监控系统		165,456
17.0	AV system 音视频系统(by client purchase)		0
		total :	**522,221**
E	**Professional design fees**		
18.0	Professional design and management fees		324,000
	(200RMB/sqm x 1620 net floor area)		
	5.5% tax on design fee		17,820
		total :	**341,820**
	GRAND TOTAL A, B, C, D & E in RMB		**5,535,253**
	GRAND TOTAL A, B, C, D & E in USD		**691,907**

Table 3.2 Shanghai Office IT Setup Budget

		单价	总价	供货周期
HP LaserJet 8150DN Printer	1 C4267A		¥29,500	4-6周
NC150T PCI 4-Port 1000TX Switch-cum-Adapter	1 367132-B21		¥1,800	4-6周
Veritas - Backup and licenses	1		¥416,648	30-45天
Citrix License	0		¥0	
VMWare	1		¥34,200	30-45天
Avocent Auto View 1000R KVM Switch 16 Port Analog / Digital KVM Switch 1 Local User, 1 Digital User, 16 Systems with AV Works Software	1 AV 1000	¥49,485	¥49,485	3-4周
Cat 5 interface module for VGA, PS2 keyboard, PS2 mouse	16 AVRIQ-PS2	¥1,530	¥24,480	
Cat 5 interface module for VGA, USB keyboard, USB mouse	1 AVRIQ-USB	¥1,530	¥1,530	
Cat 5 interface module for VGA, Sun keyboard, Sun mouse	1 AVRIQ-VSN	¥1,530	¥1,530	
Cat 5 interface module for 13W3, Sun keyboard, Sun mouse	1 AVRIQ-WSN	¥1,935	¥1,935	
FAS270 RK Base Appliance	1 FAS270-RK-BASE-C	¥ 522,366	**¥430,000**	4-6周
iSCSI Software,T2-C	1 SW-T2-ISCSI-C			
NFS Software,T2-C	1 SW-T2-NFS-C			
CIFS Software,T2-C	1 SW-T2-CIFS-C			
DataONTAP,FAS2XX-General Avail2	1 SW-ONTAP-FAS2XX-GA2 SW			
144GB,10K RPM,Universal FC Disk Drive,-C	14 X274B-C			
Pwr Cable China	2 X800K-C			
Universal rckmnt kit,4N2 Post,DS14-mid-C	1 X5515A-C			
SupportEdge Standard w/ Inst,4hrPartsDel-FAS270 Mths:36	1 CS-A-INST-4D			
HP ProLiant DL380G4 / Dual Processor Capable / Intel 7520 server chipset / Xn 3.2 GHz(800MHz FSB) with 1MB L2 Cache / 1024MB (512MB x 2) PC3200 DDR-II memory / 3-3-3 warranty	4 370596-371	¥17,000	¥68,000	7天
XN3200/800 1M for ML370G4/DL380G4	4 374492-B21	¥4,300	¥17,200	
1024MB PC3200 DDR-II DIMM Kit (2x512MB)	4 343055-B21	¥1,800	¥7,200	

72GB ULTRA320 10k HP Universal	8 286714-B22	¥2,000	¥16,000	
Hot Plug Redundant Power Supply Kit for DL380G4	4 355892-B21	¥1,500	¥6,000	
Redundant Hot Plug Fan Option Kit for DL380G4	4 293048-B21	￥800	¥3,200	
Integrated 15" TFT5600RKM monitor, drawer with keyboard and trackball	1 221546-B31	¥9,500	¥9,500	
HP ProLiant DL145 Opteron 252 2.6GHz/1MB / 80GB SATA	3 377888-001	¥21,800	¥65,400	30-45天
HP Opteron 252 2.6Ghz Processor Upgrade Kit	3 378690-B21	¥9,800	¥29,400	
Kingston 4Gb Memory Kit for DL145 Server (2 x 2Gb PER KIT) - 8GB TOTAL	6 KTH-DL385/4G	¥5,500	¥33,000	
HP 80GB SATA 7,200 RPM Hard Drive	3 383410-B21	¥1,100	¥3,300	
Sun StorEdge[TM] C4 SDLT SCSI tape library base, 2 SDLT drive bays, 32 cartridge slots; 4U rackmount. FC connectivity supported via optional FC bridge.	1 SG-XLIBSDLTS-C4	¥39,224	¥39,224	30-35天
Sun StorEdge C-series SDLT 600 LVD SCSI tape drive; 300GB native capacity, 36 MB/sec native throughput	1 SG-XTAPSDLT6S-C	¥77,560	¥77,560	30-35天
Redundant power option for C4, C10 tape libraries. C4 requires 1 to make redundant; C10 requires 2 to make redundant.	1 SG-XREDPWR-C	¥6,088	¥6,088	30-35天
4-meter HD68 to VHDCI68 differential Ultra SCSI cable	1 X3830A	¥1,358	¥1,358	30-35天
Sun StorEdge PCI dual channel Ultra320 differential SCSI host bus adapter	1 SG-XPCI2SCSI-LM320	¥3,945	¥3,945	现货
SDLT 2 data cartridges for SDLT 600 drives - 20 Pack	1 SG-XMEDSDLT2D-20	¥26,713	¥26,713	30-35天
SDLT220/320 cleaning carts-10 pack	1 SG-XMEDSDLTCL-10	¥9,365	¥9,365	30-35天
Sun Fire V20z 1U AMD-based server Base Chassis - Chassis, Motherboard, 2x10/100/1000 Ethernet ports, PCI-X slots, Internal AC Power Supply, no power cord; order Geo-specific X-option. Compatible only with the following CPU options: 9855A,9856A,9857A,9858A. XATO ONLY. K2.5	1 A55E-AA	¥46,553	¥46,553	现货
4 GB memory(2x2GB) SFV20z	1 X9253A	¥0	¥0	
AMD Opt 250 CPU SFV20z K2.5	1 X9857A	¥0	¥0	
73GB 10K RPM U320HD SFV20zV40z	1 9256A	¥0	¥0	
CD Drive/floppy drive SFV20z	1 9259A	¥812	¥812	30-35天
802.11g IOS AP w/Avail CBus Slot, FCC Cnfg	1 AIR-AP1231G-A-K9	￥4,895	¥4,895	10天

AIR Line Cord Asia Pacific (APAC)	1	AIR-PWR-CORD-	￥121	¥121 6-8周
Cisco 1200 Series IOS WIRELESS LAN	1	S12W7K9-12307JA	￥0	¥0
APC 5KVA UPS with racks(note: rack is included)	2		12000	¥24,000 7天
Cisco Catalyst 3560 48 10/100 PoE + 4 SFP Standard Image	2	WS-C3560-48PS-S	¥34,782	¥69,564 30-35天
Cisco 2811 V3PN bdle w/AIM-VPN,PVDM2-16,CCME-36,AdvIPServ,64F/256D	1	CISCO2811-V3PN/K9	¥17,110	¥17,110 30-35天
IBM Laptop (inc MS office)				
T42 laptops with XP professional	100	2668-CC6 P-M 740 1.7G 512M/60G 14.1TFT COMBO 64M显卡 56k 1000M XPP 无线网卡 3Y	17000	¥1,700,000 10天
MS office and licenses	0			¥0 10天
LCD Monitor 21' flat screen（目前只有20"液晶）	0		13000	¥0
VoIP phones from Cisco				
Cisco 7912G IP phone	150	CP-7912G-A	¥1,416	¥212,400 6-8周
Cisco CallManager Express licenses	150	SW-CCME-UL-7912	¥646	¥96,900 6-8周
		Total(RMB):		**¥3,585,916**
		Grand Total in US dollars:		**$ 448,240.00**

3.3.3 Financial Resource

Refer to Table 1 in the Appendix for a quick snapshot of the company's overall financial picture. It provides projection of financial performance through to 2014 including revenue, net income and profit margin. The analysis gives an important insight to the company's growth path as well as a way of calculating SEMILINK's corporate value and theoretical share prices.

Below is SEMILINK's recent quarterly balance sheet Table 3.3 (Yahoo, Finance). Note the highlighted cells for further explanation. Underlined cells indicate potential problems while the bold ones show a healthy status.

Table 3.3 SEMILINK Balance Sheet

Balance Sheet for SEMILINK

View: Annual Data | **Quarterly Data** All numbers in thousands

PERIOD ENDING	2-Apr-06	31-Dec-05	2-Oct-05	3-Jul-05
Assets				
Current Assets				
Cash And Cash Equivalents	153,407	405,566	143,472	162,981
Short Term Investments	49,196	**221,910**	232,390	143,755
Net Receivables	45,038	31,799	37,789	25,086
Inventory	25,603	14,046	13,010	14,712
Other Current Assets	31,835	13,630	16,448	16,688

Total Current Assets	305,079	686,951	443,109	363,222
Long Term Investments	11,852	9,231	15,342	59,828
Property Plant and Equipment	18,324	10,981	11,609	14,219
Goodwill	246,261	7,907	7,907	7,907
Intangible Assets	170,708	5,575	4,905	4,853
Accumulated Amortization	-	-	-	-
Other Assets	5,145	5,692	5,145	5,145
Deferred Long Term Asset Charges	-	6,612	-	-
Total Assets	**757,369**	**732,949**	**488,017**	**455,174**

Liabilities

Current Liabilities

Accounts Payable	128,132	110,446	110,239	99,314
Short/Current Long Term Debt	-	-	11,451	-
Other Current Liabilities	12,212	11,004	-	8,079
Total Current Liabilities	**140,344**	**121,450**	**121,690**	**107,393**
Long Term Debt	225,000	225,000	-	-
Other Liabilities	-	-	-	3,636
Deferred Long Term Liability Charges	29,090	29,090	28,077	28,077
Minority Interest	-	-	-	-
Negative Goodwill	-	-	-	-
Total Liabilities	**394,434**	**378,902**	**149,767**	**139,106**

Stockholders' Equity				
Misc Stocks Options Warrants	-	3,362	-	-
Redeemable Preferred Stock	2,830	-	3,370	-
Preferred Stock	-	-	-	-
Common Stock	940,267	919,055	918,161	907,432
Retained Earnings	(581,064)	(566,731)	(584,976)	(590,911)
Treasury Stock	-	-	-	-
Capital Surplus	-	-	-	-
Other Stockholder Equity	902	1,723	1,695	(453)
Total Stockholder Equity	**360,105**	**354,047**	**334,880**	**316,068**
Net Tangible Assets	**($56,864)**	**$340,565**	**$322,068**	**$303,308**

First, a lower cash flow is a concern with only $200 million in cash and short-term investments. A company as SEMILINK needs roughly $95 to $100 million a quarter to break even. The total cash is equivalent to roughly two quarters running cost while Broadcom has 2.4 billion cash and short-term investments equivalent to 3 times of their quarterly costs.

Second, none of the market leaders in SEMILINK's industry carries a large chunk of debt. In fact, all of the fiscally strong companies carry no debt at all.

Net tangible assets of SEMILINK are negative $57 million dollars. It is rather rare in the industry. As a result, SEMILINK might have trouble raising further debt or equity with

favourite terms. Hence, it will affect the firm's cost structure and long-term expansion potential. Having limited cash on hand and not being able to raise debt and equity will severely limit the company's ability to acquire other companies or technology, which are the key methods of growing the business.

This leaves the company with only one option. That is to develop the technology internally. In this case, SEMILINK's R&D cost is already at 45 percent of the revenue. It is on the high side in a comparison with other industry peers. Fundamentally changing the way of thinking for R&D cost holds the key to solving the predicament.

To move the design centres offshore and to dramatically reduce the R&D cost are the logical solution to the problem. A dollar saved is a dollar earned. As discussed previously, the money saved could go towards long-term cash reserve for future acquisition. The money could also be invested in more projects right away for more in-house developed technologies that will create future revenue.

There will be indeed some initial costs of setting up a design centre in China in terms of facility build-out, IT infrastructure setup, employee hiring and training. It presents a potential financial gap that needs to be filled. The cost will typically include one-time charges plus the running costs.

- There is a financial gap in implementing the China Design Centre while the Return-On-Investment period is unknown.

The analysis that follows will try to address the solutions to close those gaps and make the China Strategy financially viable. As discussed earlier, facility cost and IT setup will be key initial start-up expenses. Table 3.4 gives the summary of the both start-up and running cost on the facility, IT and other related budget projections.

Table 3.4 Shanghai Office setup and running budget projections

SEMILINK Shanghai Office setup and running budget projections

	Startup/0ne time charges	*Running Costs(per year)*
Facility:	$ 691,907.00 (Detail figure 3.3)	$360,000.00 (Rental and Admin expenses including phone costs...)
IT:	$ 448,420.00 (Detail figure 3.4)	$180,000.00 (Network, hardware support contracts and 1 supporting staff)
Staff Travel:	$ 45,000.00 (10 staff*month)	$100,000.00 (5-7 staff from NA full time onsite living and other expenses)
Training & others:		$120,000.00 (training and other related costs)
Other Services:		$ 50,000.00 (Payroll, accounting, Tax, employee benifits and HR managed by both outsourcing and remote management from HQs)
Contengency fund:	$ 100,000.00	$ 50,000.00 (emgergency fund)
	$ 1,285,327.00	**$860,000.00**

Note and Assumptions:

- All costs are estimated in US dollars
- All other not mentioned services are managed either remotely or outsourced to local companies or combination of both
- The site is a design center with 150 employees
- The running cost is the average of 5 years span
- It does not include staff salary, R&D equipment and assoicated costs

Based on the projections above (Table 3.4), the overall cost benefit over the next five years including the salary and related savings has been calculated. Figure 3.6 shows that on an amortized basis over the five years. To maintain a China-based 150-engineer office will save SEMILINK roughly $11 Million annually with a total of 41 Million dollars over the five-year period. $11 million is equivalent to 15-20 percent of the company's net profit in a good year.

- ✓ With 1.28 million dollars for initial investments, the ROI will be within three months in long-term views. Larger deployment in China means even more significant savings.

Table 3.5 Shanghai Office Overall Cost Benefit(Annually)

Shanghai Office overall cost benefit(Annually)			
	Before(North America)	After(Shanghai, China)	Difference:
150 engineer team Salary:	$ 14,732,143	$ 5,625,000	$ 9,107,143
150 engineer benefits	$ 4,419,643	$ 1,687,500	$ 2,732,143
Running cost(Figure 3.5)	$ 860,000	$ 860,000	$ -
Amortized startup costs	$ -	$ 257,065	$ (257,065)
Total cost:	$ 20,011,786	$ 8,429,565	$ 11,582,220

Note:
All costs is in US dollars
Average engineer cost in North America is $110000 as previously discussed
Average engineer cost in China is $30000 also as discussed earlier
Both running costs are the same. In reality, North America cost will be higher than China

Net Present Value of savings over five years:					
	Year 1	Year 2	Year 3	Year 4	Year 5
$	11,582,220	10,625,890.20	9,748,523.12	8,943,599.19	820,513.69

Total Savings(5 years)
$ 41,720,747

- ✓ Based on the above analysis, in order to take advantage of the long-term savings, SEMILINK needs to budget $1.3 million up front to kick off the process. With $200 million in the bank, SEMILINK should have no trouble financing the operation. According to Figure 3.5, salary saving is by far the biggest piece of cost differentials. All the other items are rather small in scale. As long as shifting of HR resources to China could be achieved, significant savings will be realized.

In summary, implementation of the design centre in China does present some challenges and gaps with respect to Management Preferences, Organizational Structure and company resources. At the same time, however, with careful planning and management

to close those gaps, the China strategy should enhance the company's overall cost structure, financial strength, competitiveness and ultimately, shareholder prosperity.

4 RECOMMENDATIONS

Based on the analysis above, SEMILINK should implement the offshore design centre strategy with great resolve. The primary destination should be Shanghai, China. The following consideration should be taken into account:

1. Communicate well within the company for the offshore design centre initiative as a corporate strategy. Make sure the buy-in from all levels of management as well as the engineering community for the long-term benefits.

2. Transition of the design resources to the China office should be gradual and staged to reduce the impact to the existing work force and the productivity in general.

3. Provided a high turn-over rate in the hi-tech industry, the approach would be to extensively use attrition to avoid the layoffs in accomplishing the shifting of the design forces to China.

4. Carefully build up the China office by transferring necessary competencies, culture and knowledge between units to ensure the better local IP protection.

APPENDICES

Table 1 Discounted Cash Flow Model

Discounted Cash Flow model for SEMILINK, INC.

($ millions except per share data)

	2004	2005E	2006E	2007E	2008E	2009E	2010E	2011E	2012E	2013E	2014E	
Revenue Growth	19%	11%	12%	20%	19%	18%	17%	16%	15%	14%	13%	
Net Income	$34	$54	$60	$89	$106	$125	$146	$161	$185	$189	$213	
Net Income Margin	12%	11%	20%	20%	20%	20%	20%	19%	19%	17%	17%	
Depreciation & Amortization	$17	$28	$38	$40	$41	$44	$47	$51	$55	$60	$65	
Changes in Working Capital	($7)	($3)	($5)	($7)	($22)	($10)	($11)	($12)	($13)	($14)	($15)	
CapEx	($16)	($19)	($37)	($44)	($49)	($54)	($59)	($65)	($72)	($79)	($87)	
Net Investment in Capital	($6)	$6	($4)	($11)	($29)	($20)	($23)	($27)	($30)	($34)	($37)	
FCF to shareholders	$28	$60	$56	$78	$77	$105	$123	$134	$155	$155	$176	
FCF growth y/y	58%	114%	-7%	39%	-1%	36%	17%	9%	16%	0%	14%	Total:
PV of FCF	$29	$53	$43	$52	$45	$54	$55	$53	$53	$47	$46	$530
	0	1	2	3	4	5	6	7	8	9	10	

Valuation		Discount Rate	
Sum of PV of FCF	$530	Shares Outstanding	190
PV of terminal value	$664		
Equity value	$1,194		
shares outstanding	190		
Equity value / share	$6.28		

Following assumptions were used when building the Discounted Cash Flow(DCF) model:

1. ***Cost of equity 12.5%***
2. ***Long-term growth rate of 4.0%***
3. ***Beta of 2.0***
4. ***10-year risk free rate of 4.5%***
5. ***Equity risk premium of 4%***

REFERENCE LIST

1. Bukszar, E.(2006). Strategy Course. Executive MBA course 607. Vancouver, BC: Simon Fraser University

2. SIA, Semico Research Corp. (2004). Industry Revenue Distributions.

3. Porter, M.E. (1979). How competitive forces shape strategy. Harvard business Review, March-April, p. 2-10

4. Yahoo Finance. (2006). Business Summary, Company Profile, Broadcom Corporation

5. Broadcom Corporation. (1999). 1999 Annual Report

6. Broadcom Corporation. (2000). 2000 Annual Report

7. Broadcom Corporation. (2001). 2001 Annual Report

8. Broadcom Corporation. (2002). 2002 Annual Report

9. Broadcom Corporation. (2003). 2003 Annual Report

10. Broadcom Corporation. (2004). 2004 Annual Report

11. Broadcom Corporation. (2005). 2005 Annual Report

12. Yahoo Finance. (2006). Business Summary, Company Profile, Applied Mirco Circuits Corporation

13. Applied Micro Circuits Corporation. (1999). 1999 Annual Report

14. Applied Micro Circuits Corporation. (2000). 2000 Annual Report

15. Applied Micro Circuits Corporation. (2001). 2001 Annual Report

16. Applied Micro Circuits Corporation. (2002). 2002 Annual Report

17. Applied Micro Circuits Corporation. (2003). 2003 Annual Report

18. Applied Micro Circuits Corporation. (2004). 2004 Annual Report

19. Yahoo Finance. (2006). Business Summary, Company Profile, Vitesse Semiconductor

20. Vitesse Semiconductor. (1999). 1999 Annual Report

21. Vitesse Semiconductor. (2000). 2000 Annual Report

22. Vitesse Semiconductor. (2001). 2001 Annual Report

23. Vitesse Semiconductor. (2002). 2002 Annual Report

24. Vitesse Semiconductor. (2003). 2003 Annual Report

25. USB Warburg LLC. DSL Market Size Trend. SEMILINK internal presentation. (2005). USB Warburg LLC. Feb 25, 2003